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The Marine Observer

A quarterly journal of Maritime Meteorology

Volume XXI No. 153

July, 1951

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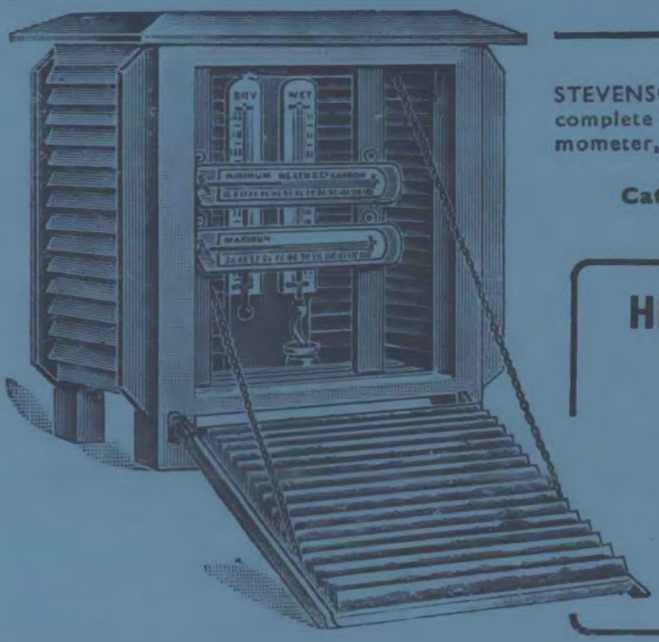

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M.O. 546 AIR MINISTRY

THE MARINE OBSERVER

A Quarterly Journal of Maritime Meteorology

prepared by the

Marine Branch of the Meteorological Office

VOL. XXI No. 153 JULY, 1951

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INTERNATIONAL METEOROLOGICAL CONGRESS, ROME, 1879

EDITORIAL

Meteorology is defined in the " Meteorological Glossary " as " the science of the atmosphere ", the word being derived from the Greek " *meteoros* ", lofty or elevated, and " *logos* ", discourse; the atmosphere is described as " the air which surrounds us and is carried along with the earth ". This atmosphere of ours, being a gas, obeys the normal physical laws of other gases and, whether we want it or not, is always around us wherever we go on this earth. To avoid its influence entirely we must build a gas-tight chamber, or go beneath the waters, or we can avoid some of its influence by going to enormous heights in an aircraft. The land and sea have their natural boundaries and their frontiers—the atmosphere is everywhere and knows no frontiers.

Having such a ubiquitous material to study, it is natural and indeed essential that meteorologists should be international in their outlook. One can think of many vital subjects on which international co-operation and consultation are necessary and desirable, and there is little doubt that shipping, aviation, health and telecommunications, as well as meteorology, come very high in the list. Meteorology, however—particularly from the synoptic viewpoint—is unique, in that without international co-operation practically nothing can be accomplished. Consider, for example, the scope of the weather map drawn in Great Britain if no reports were available from Iceland, Greenland, Norway and France, even though the reports received from all British ships in the Eastern Atlantic were included. For a complete picture the modern meteorologist needs reports from as far afield as the U.S.A. and the U.S.S.R. Without international co-operation, the transmission, reception and understanding of these reports would be virtually impossible. In the world of climatology, too, international co-operation is essential, for we need to study the meteorology of the world as a whole. For meteorology becomes more and more important to all of us in the light of the economic, social and health problems of this modern world, especially in view of increasing populations and the consequent shortage of food.

The basic international character of meteorology is well illustrated by the fact that one of the earliest international conferences in history took place in Brussels in 1853 in connection with meteorology. It is pertinent to recall that this conference was inspired by a sailor—Lieut. Maury of the U.S. Navy—with the object of collecting information about winds and currents from the oceans for the benefit of seamen and of commercial shipping generally. Maury may thus be said to be the father of International Meteorology. It was as a direct result of this Brussels meeting that the British Meteorological Office was formed in 1854.

In 1873, the directors of various Meteorological Services held the first International Conference of Directors at Leipzig, and thus was born the International Meteorological Organisation—probably the oldest international organisation in the world. The International Meteorological Organisation (popularly known as the I.M.O.) was only demi-official in its status for it had no convention or Governmental authority; its members were the directors of the Meteorological Services of the world and their advisers. Its aims were broadly to arrange the exchange of meteorological information throughout the world, and to improve meteorological knowledge for the good of mankind. The Conference of Directors was advised by a number of technical

CONGRESS OF THE WORLD METEOROLOGICAL ORGANISATION, PARIS, 1951

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commissions (Climatological Commission, Maritime Commission, etc.), all of whose members were experts in their particular spheres, and the Conference of Directors at their meetings approved or rejected the recommendations submitted to them by these commissions. The decisions made by the Conference of Directors were loyally put into effect by the Meteorological Services of most countries, and it is true to say that this demi-official scientific organisation showed to the world a shining example of international co-operation and fellowship.

Time marches on, and modern conditions have made it necessary that international meteorology should be raised to an intergovernmental status, having the title "World Meteorological Organisation" under the auspices of the United Nations Organisation. A convention for the new organisation was drawn up by the Conference of Directors at Washington in 1947. On 17th March, 1951, the Conference of Directors of the old I.M.O. had their last meeting in Paris, and on 19th March the new World Meteorological Organisation officially came into existence with the opening of its first congress. It is perhaps of interest that Mr. R. Scott, Director of the Meteorological Office, was one of the presidents at the first I.M.O. Conference in 1873, and that Sir Nelson Johnson, our present Director, was president of the final Conference in 1951. Sir Nelson also officiated as president of the first congress of the World Meteorological Organisation.

The World Meteorological Organisation comprises at present 46 members which are States, and 20 territories whose international relations are conducted by the Member States.

The aims and objects of the World Meteorological Organisation will be very similar to those of the old I.M.O., the essential difference being that decisions made by the Congress of the World Meteorological Organisation will possess a more formal status than those made by the I.M.O. Meteorological research, the establishment of meteorological stations in remote parts of the world, and even the provision of modern meteorological instruments, are all expensive items, and it is therefore desirable that the Organisation which arranges for such matters on an international scale should have a governmental status, even if only from the point of view of the world's taxpayers.

The individuals responsible for the work of the World Meteorological Organisation are technicians and are essentially the same individuals who carried out the work of the old I.M.O. It is to be hoped and expected that under this new Organisation the meteorologists of the world will continue to work together in harmony and, indeed, personal international friendship, as they have done in the past so that the fruits of their labours can be applied to the benefit of mankind.

The important part that shipping and seamen play is recognised by the World Meteorological Organisation, and technical advice on all aspects of maritime meteorology will be entrusted to the Maritime Commission of that Organisation. Meteorologists realise that, without the co-operation of shipping, information about the movement and development of weather systems in the oceanic three-quarters of the world would be sadly lacking; at the same time they appreciate the necessity of providing adequate weather information for shipping, for the safety of life and property and for economic reasons, in all oceans. In addition to organising an adequate number of voluntary observing ships under all flags, and providing information for

them in all oceans, the Maritime Commission will deal with such problems as the study of ocean waves and sea ice, climatological information for shipping, and the promotion of research in maritime meteorology.

Other technical commissions of the World Meteorological Organisation will deal with general climatology, aeronautical aspects of meteorology, aerology (which embraces the composition, structure and physical and dynamical processes of the atmosphere), instruments and methods of observation, synoptic meteorology (including telecommunications problems) and agricultural meteorology. All technical aspects of this science will thus be under constant review and kept up to date.

Elsewhere in this number of *The Marine Observer*, under the title "Work of the Year", will be found a few facts about the contribution which the masters and officers of British merchant ships have made during the year toward international meteorology. These voluntary observers can feel justly proud of this scientific work which they have done for the good of mankind, and they can feel sure that their efforts are appreciated by all those who are interested in meteorology. The names of those observers whose work has been of such a consistently high quality as to justify the award of a "prize" are given on pages 151 and 152, and we congratulate them upon their achievements.

MARINE SUPERINTENDENT

WORK OF THE YEAR (ENDING 31st MARCH, 1951) OF THE MARINE BRANCH OF THE BRITISH METEOROLOGICAL OFFICE AND THE VOLUNTARY OBSERVING FLEET

1. Voluntary Observing Ships

(*a*) GENERAL

The Voluntary Observing Fleet is comprised as follows:

(i) *Selected Ships*, which make and record meteorological observations at standard synoptic hours. Meteorological instruments, instructions and logbooks are supplied to these ships. The observations are transmitted by radio in an international code to specified meteorological centres from all oceans. (See Table III.)

(ii) *Supplementary Ships*, which make and transmit observations in an abbreviated form at the main synoptic hours. These ships are supplied with a thermometer and screen and a mercurial or aneroid barometer if required; these instruments are sufficient for reporting in the abbreviated code. The present number of supplementary ships is about 25 (which includes 11 trawlers), but it is hoped to recruit up to 50 in the near future. Supplementary ships have been particularly asked to send radio weather messages in areas where shipping is relatively sparse.

(iii) *Light Vessels*, which have been recruited to provide observations of wind, visibility, weather, air and sea temperature twice daily, at 0600 and 1500 G.M.T. These observations are passed to the nearest coastguard station by radio-telephony and thence by telegram to the Central Forecasting Office. Four of these light vessels make and report observations of waves.

The meteorological logbooks from all these ships are sent to the Marine Branch for climatological study.

(iv) *Marid Ships*, coastal vessels, which are equipped with sea thermometers and canvas buckets; they make and transmit, by wireless, observations of sea temperature in home waters for the benefit of the forecast service.

Foreign Ships

Radio weather messages from ocean weather ships operated by other nations in the North Atlantic and from foreign selected merchant ships have also been received regularly throughout the year at the Central Forecasting Office.

Whalers

Arrangements were again made for selected British whaling vessels to co-operate with the Anglo-Scandinavian Expedition at Queen Maud Land in the Antarctic, as they did during the previous season, when the number of reports received was quite creditable.

Quality of Observations

Meteorological records received from British ships are carefully scrutinised and classified when they are received in the Marine Branch, and the central forecasting office is encouraged to criticise the quality of the radio weather messages received. These investigations show that the meteorological work done aboard these ships generally attains a high standard, and reports received from Port Meteorological Officers show that masters and officers show considerable interest in the work. Much credit is due to these voluntary observers in British ships for the careful way in which they make and record these observations—which are of value not only to shipping but to users of meteorological information all over the world.

(*b*) NUMBER OF BRITISH OBSERVING SHIPS.

Table I shows the number of vessels of each class monthly throughout the year.

TABLE I

	1950									1951		
	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
*†No. of Selected Ships on Fleet List	496	500	499	500	499	501	511	514	504	507	510	502
‡No. of Supplementary Ships on Fleet List	25	24	23	24	23	23	23	21	21	23	22	26
No. of Marid Ships on Fleet List	67	68	71	72	72	72	71	70	69	70	69	71
No. of Light Vessels on Fleet List	8	8	8	8	8	8	8	8	8	8	8	8

* These figures compare with a total of about 360 Selected Ships in 1939.
† Including a monthly average of five trawlers.
‡ Including a monthly average of eight trawlers.

TABLE II

	1950									1951		
	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1. BRITISH SELECTED SHIPS.												
No. reporting to Dunstable	231	256	241	246	235	204	239	227	236	227	205	232
No. of messages received	2,225	2,422	2,120	2,226	2,233	2,158	2,280	2,155	2,197	2,157	1,849	2,103
No. of groups (excluding address and ship's name) ..	19,158	20,715	18,053	18,967	19,062	18,370	19,304	18,489	18,770	18,329	15,874	17,843
Daily average of messages	74·2	87·1	70·0	71·8	72·0	71·9	73·5	71·8	70·9	69·6	66·0	67·8
2. MARID SHIPS.												
No. reporting to Dunstable	44	48	45	46	44	47	45	42	33	32	32	41
No. of messages received	264	305	341	376	373	332	289	267	214	216	199	206
Daily average of messages	8·8	9·8	11·4	12·1	12·0	11·1	9·3	8·9	6·9	7·0	7·1	6·7
3. FOREIGN SHIPS.												
No. reporting to Dunstable	222	206	194	163	164	165	193	215	157	135	171	187
No. of messages received	781	781	662	674	622	511	623	628	501	437	483	498
No. of groups (excluding address and ship's name) ..	5,942	5,985	5,006	5,025	4,666	3,853	4,735	4,583	3,767	3,277	3,728	4,025
Daily average of messages	26·0	25·2	22·1	21·7	20·1	17·0	20·1	20·9	16·1	14·1	17·2	16·1
4. LIGHT-VESSELS.												
No. reporting to Dunstable	8	8	8	8	8	8	8	8	8	8	8	8
No. of messages received	479	494	475	473	477	470	490	480	486	482	444	487
Daily average of messages	16·0	15·9	15·8	15·3	15·4	15·7	15·8	16·0	15·7	15·5	15·9	15·7

(*c*) Radio Reports

Table II shows the numbers of British selected ships, marid ships, foreign ships and light vessels reporting to Dunstable, and the number of messages received at the Central Forecasting Office, excluding reports received from ocean weather ships.

Of the reports received by radio from Selected Ships in the Eastern Atlantic a six-monthly check showed that approximately 52% were received within one hour of the time of observation and 75% within two hours.

(*d*) Equipment

Table III shows the distribution of instrumental equipment on loan to voluntary observing ships.

TABLE III

	1950									1951		
	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1. (*a*) Full set of M.O. Instruments	430	436	435*	445	451	458	466	473	468	473	481	474
(*b*) Full set of M.O. Instruments (except barograph)	9	11	12	12	11	11	14	13	12	12	11	11
(*c*) Full set of M.O. Instruments (except barometer)	51	48	47	39	33	29	28	25	21	19	16	15
(*d*) Full set of M.O. Instruments (except barograph and barometer)	5	4	4	3	3	2	2	2	2	2	2	2
2. Full " lightvessel " sets	8	8	8	8	8	8	8	8	8	8	8	8
3. " Marid " sets	67	68	71	72	72	72	71	70	69	70	69	71
4. (*a*) Supplementary Ships. Full " Trawler " sets	6	6	7	8	8	8	8	8	8	8	8	8
(*b*) Supplementary Ships. Supplementary sets	—	—	—	—	—	—	—	4	6	8	9	13

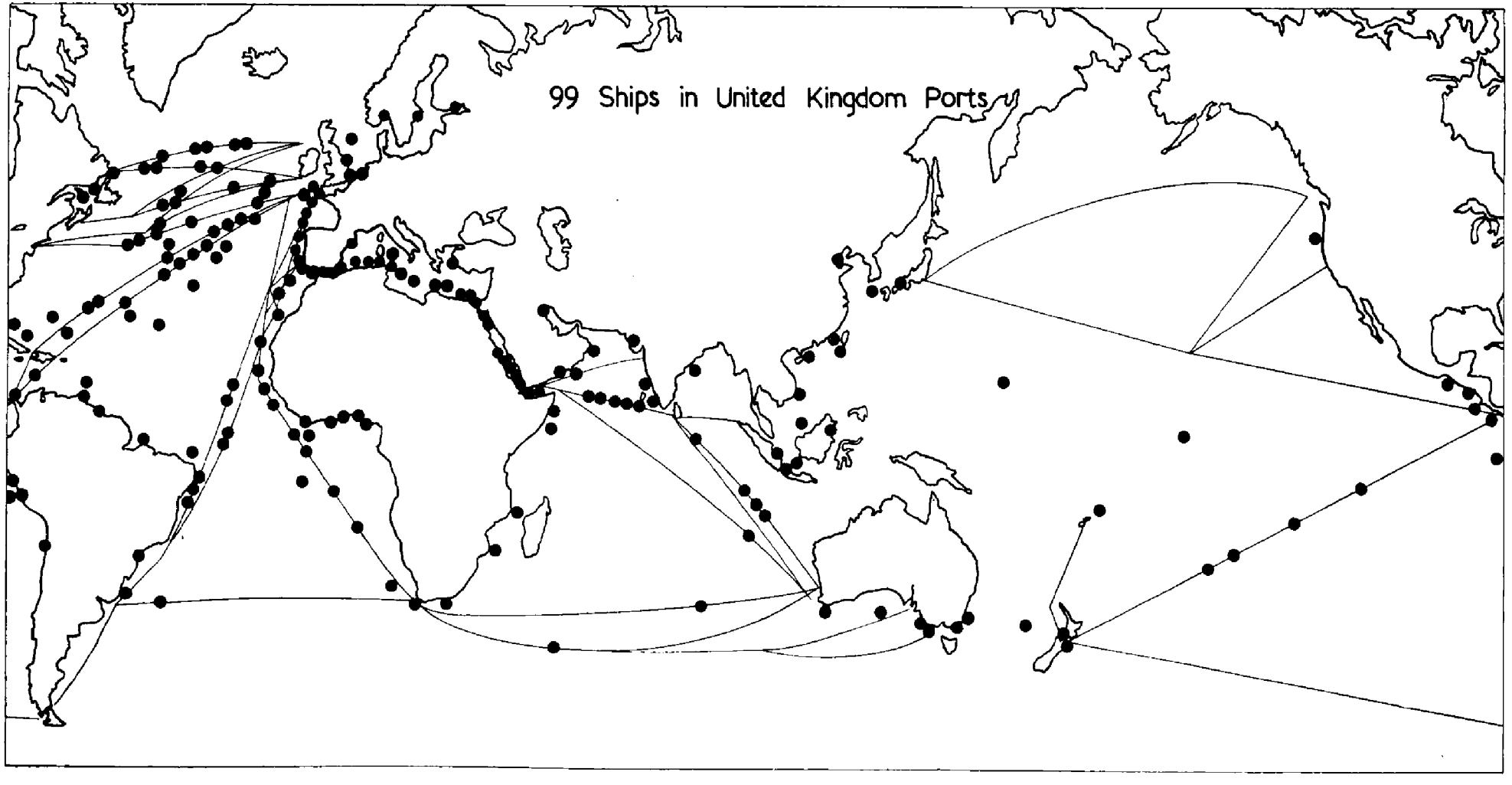
* Includes one Ship carrying Screen and Canvas Bucket only.

2. Ocean Weather Ships

The British Ocean Weather Ship Service

During the year each of the four British ocean weather ships completed three years' service as a weather ship. This year saw the implementation of the scheme whereby a Netherlands ship would carry out five periods of duty each year at Station Jig, thereby permitting the " lay up " of each British ocean weather ship annually for survey, repairs and overhaul. This joint operation of a station with our Netherlands colleagues has proved to be a good example of international fellowship.

Station Jig in position 52° 30'N, 20°00'W was manned on every day of the year except two, when the Netherlands ship proceeded to Londonderry to land a sick man. Station Item in position 59° 00'N, 19° 00'W was manned throughout the year by a British ship apart from occasions, totalling eight days, when the vessel returned to Londonderry to land sick men. Although technically on station, the ship was moved on occasions to position 61° 00'N, 14° 00'W for special operations.



THE POSITIONS OF BRITISH SHIPS WHICH MADE VOLUNTARY METEOROLOGICAL OBSERVATIONS ON 3RD NOVEMBER, 1950
(A DAY PICKED AT RANDOM)

The ships carried out a full programme of meteorological work, including surface and upper air observations, which were transmitted to the Central Forecasting Office by point-to-point radio. Air-sea rescue exercises have been carried out at frequent intervals both with British and Netherlands weather ships in co-operation with aircraft of Coastal Command, with the aim of keeping the ships' companies conversant with air-sea rescue organisation and drill. During these exercises mail and newspapers were invariably " dropped," and urgently required spare parts for the radio were dropped on occasions by the aircraft.

The weather ships' navigational aids were regularly used by both civil and R.A.F. aircraft flying over the North Atlantic Ocean: 3,534 aircraft have made use of the facilities provided by the ships during the year.

Whenever necessary the ships have obtained medical advice, by radio through C.F.O., Dunstable, from the Luton and Dunstable Hospital.

Data for International Aerological Days in 1950-51 have been prepared in the ships on station during the appropriate periods.

Radio contact had been made frequently with ocean weather ships of other nations.

Special trials were carried out aboard the ships to determine and improve the accuracy of the 277(P) Radar. Special observations were made to obtain data about rainfall, visibility and wave height at sea, and temperature and humidity in the lower levels of the atmosphere.

Mr. D. M. Houghton, of the Imperial College of Science and Technology, sailed in *Weather Observer* on her 25th voyage and carried out experiments with temperature gradient equipment.

Mr. C. A. Halstead, of Glasgow University, sailed for a voyage in *Weather Watcher* to study the operation of Loran long range navigational aid at an ocean weather station.

By arrangement with the British Trust for Ornithology, four ornithologists did a voyage in ocean weather ships during the summer of 1950, as follows:

Mr. A. Darlington sailed in *Weather Explorer*.

Mr. F. R. Allison sailed in *Weather Explorer*.

Mr. M. L. R. Romer sailed in *Weather Observer*.

Mr. M. A. Barras-Smith sailed in *Weather Watcher*.

Search and Rescue

During the period in which the Steam Trawler *Milford Viscount* was missing, *Weather Observer* maintained a listening watch on 141 metres with negative results. At the official enquiry the weather reports were quoted as evidence of the rough weather which *Milford Viscount* must have encountered.

Much credit is due to all hands aboard the weather ships for maintaining the observational and communications routine in conditions which often involve discomfort and hardship and require considerable ingenuity.

Minor changes have been made in the radio frequencies, etc., used by British ocean weather ships, and the following radio facilities are now in operation:

(*a*) *Normal or non-emergency state*

H.F. point-to-point with Dunstable	on 4380, 8705, 11525, 13365 kc/s
W.T. air guard (continuous)	on 2912, 6543, 8485, 11306 kc/s
V.H.F. emergency and distress	on 116·1, 121·5 mc/s (as requested) on 118·1 mc/s (continuous)
V.H.F. D.F. (on request)	as specified by Area Control
M.F. Beacon at H+05, H+20, H+35, H+50 for 5 minutes	on 388 kc/s at Station ITEM on 370 kc/s at Station JIG
Eureka Beacon (on request)	receive on 213 mc/s transmit on 223 mc/s

Surface search 10 cm radar (as required)
Maritime distress channel (continuous) on 500 kc/s
M.F. D.F. (as required)
Loran, associated with Consol, for fixing ship's position (as required)

(*b*) *Distress alert state*

As above, except that:
V.H.F. D.F. is operated continuously
M.F. Beacon is operated as required
Eureka Beacon is operated continuously
M.F. D.F. is operated continuously
R.A.F. air/sea rescue guard (continuous) on 3805, 6500 kc/s

3. Marine Climatology

(*a*) COLLECTION OF OBSERVATIONS

The numbers of meteorological logbooks received each month in the Marine Branch from selected and supplementary ships were as follows:

1950									1951		
April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
51	55	57	62	50	35	60	61	43	64	51	69

Logbooks and upper-air data have been regularly received from ocean weather ships at Stations ITEM and JIG. Microfilm copies of observations made at all other North Atlantic ocean weather stations and, by courtesy of the U.S.A.A.F., data from Japanese ocean weather ships in the Western Pacific, have also been regularly received.

(*b*) ANALYSIS OF OBSERVATIONS

Routine work during the year has included:

(i) Observations from logbooks received from British voluntary observing ships and weather ships, and from Naval logbooks, have been punched on Hollerith cards. The total number of observations punched was 344,757 not counting the repunching of 8,000 German cards which arrived in a damaged condition.

(ii) Duplication of data in the North Atlantic by the Netherlands Meteorological Service is continuing. Four batches of cards were shipped comprising 2,158,867 cards.

(iii) The tabulation of data extracted from the logbooks of British selected ships in the southern hemisphere sent monthly to the U.S.A. (for a special research project) comprised 38,792 observations.

(iv) The tabulation of Indian Ocean southern hemisphere data for the period February to July, 1949 (sent monthly to Indonesia) comprised 19,632 observations.

4. Currents and Ice

The computation of data for the preparation of surface current charts of the North Pacific Ocean, eastward of 160°W has been continued.

Work on the surface current atlas for the Western South Pacific Ocean is nearing completion.

An investigation is in progress of the meteorological conditions preceding the occurrence of ice on the north-west coast of Iceland, with a view to the forecasting of such ice.

5. Admiralty Pilots

The sections relating to surface currents have been entirely rewritten for new editions of eight Admiralty Pilots and generalised current charts have been prepared for these. Sections relating to ice in two Pilots have also been rewritten. The revision of the meteorological sections of Pilots required during the year has been co-ordinated with the World Climatology Branch and meteorological charts have been prepared for these publications.

6. Special Work and Investigations

Papers were prepared on:

(i) Diurnal variation of pressure in the Mediterranean Sea.

(ii) Comparison of Bucket and Intake methods for measuring sea temperatures from data obtained from British ocean weather ships and from merchant ships.

(iii) Seasonal variation of the axes of low-latitude pressure and divergence patterns over the oceans.

(iv) Seasonal changes in the mean pressure distribution over the world, and some inferences about the general circulation.

Work is continuing on the following:

(i) Some measurements of diurnal variations of air temperatures over the free oceans.

(ii) Variation of mean upper-wind velocity and momentum with height for the area between the British Isles and 20°W.

7. Inquiries

Considerable information, including statistical tables and charts of marine data, were prepared for other government departments, the Naval Weather Service and various shipping companies. Much of the above was concerned with legal inquiries and investigations into shipping casualties.

8. Lectures

Newly appointed staff to the Branch, were given lectures occupying one hour per day for 12 days on marine meteorology and observations generally.

9. Publications

The Marine Observer was published quarterly.

The seventh edition of the " Marine Observer's Handbook " was published. The book was completely re-written to take account of changes in observing practice due to the introduction of the Washington Code.

A second edition of the " Decode for use of Shipping " was published.

Two atlases were reprinted: " Monthly Meteorological Charts of the Eastern Pacific Ocean " and " Monthly Meteorological Charts of the Indian Ocean."

A second and handier sized edition of the " Marine Observer's Guide " was in the press.

Work on a new atlas—" Quarterly Surface Current Charts of the Western South Pacific "—was nearing completion.

A textbook on meteorology entitled " Meteorology for Mariners " was in course of preparation.

10. International Co-operation

(*a*) International Meteorological Organisation: Maritime Commission

The Marine Superintendent, as President of the Commission for Maritime Meteorology, represented that Commission at a meeting in Dublin in May, 1950, at which the non-aeronautical benefits arising from the existence of ocean weather ships were discussed. Many technical problems were dealt with within the Commission by correspondence during the year.

The Marine Superintendent attended the final session of the I.M.O. in Paris to present his Presidential Report which included a proposal for an International Hollerith Card for Maritime Meteorology.

(*b*) International Civil Aviation Organisation

The 1949 North Atlantic Ocean Station Agreement, which amended the 1946 agreement, remained in force, and 10 stations in the North Atlantic continued to be manned.

Exchange of microfilmed weather data from ocean weather stations was continued. Statistical information and periodical " news letters " concerning the operation of ocean weather ships have been circulated as necessary.

The Marine Superintendent attended an informal meeting at Bergen in August, 1950, at which the Anglo-Scandinavian operation of Station Mike was terminated and the Belgian-Scandinavian operation of this station was inaugurated.

The visit of the U.S. Ocean Station Vessel *Castle Rock* to Glasgow in September, 1950, enabled useful technical discussions to be held between her officers and those of the British weather ships.

Useful personal contacts have also been made between the officers of the British and Netherlands weather ships at Station Jig. These personal contacts between the officers of the weather ships strengthen the international character of the North Atlantic Ocean Weather Ship Scheme.

11. Excellent Awards

As a token of his appreciation, the Director of the Meteorological Office is arranging to present a book, suitably inscribed, to the captains, principal observing officers and senior radio officers of British selected ships whose work has been considered of outstanding quality throughout the past year The book selected for the purpose this year is " The World of Science ", by F. Sherwood Taylor.

EXCELLENT AWARDS
Year ending 31st March, 1951

Ship	Captain	Principal Observing Officer	Radio Officer
Ajax	R. A. Hanney	P. Hopper	A. H. Kirkby
Armadale	E. J. Ridout	G. C. Elvidge	E. W. Harle
Asturias	H. G. Whittle, O.B.E.	J. Anderson	G. Hunt
Athenic	B. Forbes Moffatt	P. G. Clifford	P. Haggart
Balantia	C. C. Dingle	R. L. Collins	K. Arthur
Baron Maclay	J. Reid	J. W. Cameron	J. Hopkins
Bassano	D.B.Ramsbottom,D.S.C.	J. Harbord	G. Shilson
Benarty	T. Sutherland	M. J. Peyton-Bruhl	R. Dixon
Benreoch	J. B. Hastie	R. McPhee	J. M. Fraser
Bibury	W. E. Brett	D. S. Craven	R. Biss
British Escort	H. H. Burke	R. W. Clarke	C. Henry
British Lancer	F. S. Hall	E. G. Freeman	W. Brownlie
British Marquis	S. D. Bumstead, O.B.E.	D. T. Armour	P. Richardson
British Resource	J. C. Lea	R. Elder	V. Dalton
British Statesman	J. R. Lumby	W. Sayer	J. MacCormack
Cairnavon	J. W. Scott	C. J. D. Sutherland	W. P. Greaves
Cairnesk	I. G. Foster	W. Errington	E. Johnston
Caslon	J. M. Cherry	J. F. Thompson	F. McKenzie
Cheshire	P. H. Potter	G. D. Atkinson	J. L. Banks
City of Pretoria	R. Longstaff, D.S.C.	J. P. James	J. Booth
City of Windsor	W. Doidge	T. Kerr	P. O'Mahoney
Clan Chisholm	J. McCrane	D. R. Godfrey	W. Gay
Clan MacDougall	P. MacMillan	J. A. Molyneux	C. E. C. Crew
Clan MacDonald	H. Cater	J. P. Dunphy	G. Martyn
Comedian	H. J. Wells	D. Bloom	H. McGee-Gorman
Condesa	H. Heal	S. J. Edginton	J. S. Bishop
Corinthic	G. M. Robertson, D.S.C.	H. M. Hignett	A. W. Allen
Coulgorm	G. Robison	P. McKellar	E. Yard
Craftsman	W. F. O'Neill	J. M. Ritchie	R. J. Francis
Cumberland	A. E. Williams	P. Moulton	W. Sykes
Deebank	B. Rivett	A. H. Pickles	A.A.MacPherson
Derryheen	R. Storm	J. McLellan	J. Byrne
Deseado	S. J. G. Hill	P. C. T. Davies	J. S. Humphrey
Devon	A. Hocken	J. D. Hellings	L. Carter
Devonshire	A. Beharrel	J. Farrow	G. C. Talbot
Dorelian	D. MacQueen	D. Langwill	B. Kimble
Durango	P. M. Burrell	J. Postill	H. Davies
Durham	R. J. Dunning	J. K. Thomas	C. Robinson
Eros	R. C. Vigurs	H. Beyer	H. Green
Esperance Bay	T. V. Roberts, R.D., R.N.R.	J. K. Wyles	M. J. Sheehan
Essex Trader	D. G. Evans	D. Harris	R. Jones
Fanad Head	W. A. Haddock, O.B.E.	R. Harris	J. J. Dunne
Fort Spokane	A. G. Cuthill	D. A. Davies	H. M. Bursen
Glenartney	C. J. Tyler	H. H. MacFarlane	J. F. Wilson

Ship	Captain	Principal Observing Officer	Radio Officer
Glenorchy	C. Houghton	P. Menmuir	L. A. Tebbutt
Haparangi	C. R. Pilcher, O.B.E.	A. Faulkner	L. Rayner
Harmatris	A. R. Phelps	A. H. Barber	P. Corbishley
Helicina	D. T. Keddie	M. P. Shillito	J. J. Moran
Himalaya	H. C. C. Forsyth	C. Barrett	F. Ash
Hororata	E. H. Hopkins	R. S. Hales	D. Hodding
John Holt	J. Shaw	R. G. Griffiths	J. R. Schofield
Kent	N. A. Thomas	R. Kinloch	R. Heath
King William	A. B. Drever	J. C. Davies	A. MacInnes
Laguna	R. D. S. Eckford	P. G. A. James	F. Twomey
Lord O'Neill	R. A. Ferguson	W. H. Thornton	C. A. Murphy
Maloja	E. J. Parry	R. A. Game	W. Dawson
Manchester Progress	W. H. Downing	L. Taylor	W. H. Critchley
Matina	H. Roberts	H. G. Cresswell	H. C. Knight
Mataroa	R. G. James, R.D., R.N.R.	P. H. Caiden	L. Boyce
Moveria	J. Jack	A. C. Henderson	R. Robinson
Nestor	E. W. Powell, M.B.E.	J. D. Penny	L. Booth
New Australia	D. Aitchison	W. Newport	—. Chick
Newfoundland	C. H. Kenyon	J. B. Stewart	T. Cahill
Northumberland	L. W. Fulcher	T. G. Fuller	T. M. Jones
Nova Scotia	J. E. Wilson, O.B.E.	J. D. Williamson	W. C. Brook
Pacific Exporter	E. A. Kemp	R. G. G. Bonney	A. Cory
Pacific Fortune	E. O. Evans	W. G. Sturt	—. Thomas
Pacific Importer	B. M. Collard	E. H. Gresson	A. J. Butcher
Pacific Stronghold	F. H. Perry	J. H. Clarke	S. A. Vincent
Papanui	D. Chadwick	M. R. Forcer	P. Roberts
Paparoa	H. C. R. Dell	F. I. Christall	A. B. Mowatt
Parthia	C. B. Osborne, R.D., R.N.R.	K. T. Jones	W. McCormick
Port Auckland	W. J. Enright, O.B.E., R.D., R.N.R.	M. L. Mitchell	J. Skinner
Port Brisbane	H. Steele, O.B.E.	P. W. Smith	J. Griffiths
Port Hobart	T. Kippins, O.B.E., D.S.C.	E. Newstead	B. Morley Evans
Port Lincoln	L. Copeland	B. St. J. Smith	P. J. McKeon
Port Philip	J. G. Lewis, O.B.E.	J. A. W. Ashburner	B. McGovern
Port Pirie	F. W. Bailey, M.B.E.	P. G. Henneker	W. Miller
Port Wellington	E. J. Syvret	M. W. Raggett	J. B. French
Rakaia	A. J. Robertson, A.D.C., R.D., R.N.R.	D. E. Moran	R. Wilson
Rangitata	G. Kinnell, O.B.E.	G. Pool	J. Grant
Rialto	G. Hodgson	F. H. Johnson	J. Sanderson
Richmond Castle	J. A. Sowden	C. J. Willis	F. Shea
Roslin Castle	F. R. Pope	G. E. Smith	J. Tuck
San Felix	C. Summers	R. Wilkinson	W. L. Radcliffe
San Velino	M. A. Connell	G. G. B. Putt	F. Estcourt
Scholar	D. Wolstenholme	S. Hemingway	R. Anderson
South Africa Star	R. White	W. V. L. Burne	N. H. Aldersley
Southern Venturer	H. Myhre	A. N. Aitken	J. Hawick
Sovac	A. McCausland	H. E. Harrington	K. C. Morriss
Speaker	E. V. Dunn	R. J. Abbott	G. A. Bart
Sutherland	R. W. Nicolson	G. Galloway	J. R. Lloyd
Tekoa	H. A. Harwood	P. B. Eccles	W. F. Shepherd
Theliconus	T. W. Webster	J. V. Cook	R. Keogh
Thule	Sigurd Andersen	S. Farmer	Eigill Bergan
Tongariro	C. P. Robinson	J. B. Camping	J. Hasson
Volo	G. Mussared	C. Everingham	G. Williams
Waipawa	F. A. Smith	A. Cripps	J. Murphy
Waiwera	L. J. Hopkins	J. B. Cousins	J. Downie
Worcestershire	F. C. Brooks	R. Phillips	W. Fletcher

The Marine Observers' Log

JULY, AUGUST AND SEPTEMBER

The Marine Observers' Log is a quarterly record of the most unusual and significant observations made by mariners.

The observations are derived from the logbooks of marine observers and from individual manuscripts. Photographs or sketches are particularly desirable.

Responsibility for each observation rests with the contributor.

TURTLES

North Atlantic Ocean

S.S. *San Felix*. Captain C. Summers. Curaçao to Sheerness. Observer, Mr. R. Wilkinson, 2nd Officer.

14th July, 1950. The vessel passed close up alongside two turtles, each about 2 ft. in diameter and of a speckled brown colour. Floating a few yards off were some patches of Gulf weed and an old 50-gallon oil drum. Weather had been very calm and hot for three or four days. The sea temperature was 79°F.

Position of ship: 32° 24'N, 48° 16'W.

Note.—The above observation was referred to Dr. Parker of the Department of Zoology, Natural History Museum, who sent us the following comment.

" It is not possible to identify the turtles with certainty but the colour suggests that they were either Atlantic Loggerheads (*Caretta caretta*) or Hawksbills (*Eretmochelys imbricata*). Specimens of two feet diameter would be immature, perhaps three to four year-olds. In any event the observation is important as so little is known of the extent to which these marine reptiles move about in the open oceans.

" It is generally believed that most turtles have a strong homing instinct and return for breeding to the shores where they were born. The few marking experiments that have been carried out confirm this and further confirmation comes from the fact that, in some instances at least, local populations have distinctive characters. Tortoise-shell, for instance, which is derived from the Hawksbill, varies in price according to the locality from which it comes and dealers can distinguish samples from different localities at a glance. If the turtles moved about and repaired, at random, to the nearest beach for breeding it is unlikely that these characteristic local races would have developed or would persist. But whether turtles normally wander far from their own breeding areas and undertake long migrations to return to them is not known. Mr. Wilkinson's observation would, at first glance, appear to indicate that this does happen; the nearest breeding site, Bermuda, is over 800 miles to the west. It is, however, possible that these turtles were on a journey from which there would be no return. Almost every autumn turtles, mostly immature, are stranded on the coasts of N.W. Europe, especially the British coast, and there is reason to believe that these vagrants originate from the Caribbean and neighbouring seas.

" The causes of these suicidal transatlantic journeys are not known but they may be associated with the migration of eel larvae from the Sargasso sea to the European rivers. The vast congregation of these larvae, travelling slowly across the ocean,

form an almost inexhaustible food supply for large numbers of predatory fish which, in turn, would offer an easy living to any wandering turtle that encountered them. An immature turtle accidently finding itself in this situation would have no urge to leave such a sea of plenty until, reaching colder European waters at the onset of winter, it found itself beyond the point of no return."

SUBMARINE DISTURBANCE

Off the Coast of Chile

M.V. *San Velino.* Captain J. B. Macarthy, O.B.E. Panama to Valparaiso. Observer, Mr. G. G. B. Putt, 2nd Officer.

25th September, 1950, 1810 G.M.T. The vessel was shaken violently by some external influence. The noise and shock was very similar to that caused by several depth charges being dropped very close to the ship. No disturbance of the water was seen. Our speed increased from 10 to 14½ knots with a strong indraught to the coast. Sea and swell moderate from S'W.

It was later ascertained at Valparaiso that a violent earth tremor was recorded at the Chilean University at 1810 on the 25th, a disturbance of 6 on the international scale* having been recorded. The reports placed the disturbance near to our position.

Position of ship: 32° 10'S, 71° 47'W.

LINE OF DEMARCATION

North Atlantic Ocean

S.S. *Matina.* Captain H. Roberts, O.B.E. Southampton to Port of Spain. Observer, Mr. R. L. Leech, 3rd Officer.

9th July, 1950, 1230 G.M.T. A well-defined line of demarcation was observed between two different coloured waters, with scum on the surface. The line was jagged and ran 340°/160° (T) from horizon to horizon.

Position of ship: 20° 47'N, 52° 29'W.

M.V. *San Cirilo.* Captain T. L. Pearson. Rio to Curaçao. Observer, Mr. B. J. Hamilton, 2nd Officer.

14th September, 1950, 2035 G.M.T. The vessel crossed the edge of a line of discoloured water which was very well-defined with white scum noticeable on the surface. There was an appearance of continual movement and minute eddies and whirls. The general direction of the line was N–S. The density was 1020 at 84°F.

Position of ship: 5° 30'N, 50° 42'W.

TIDE RIPS

South African Waters

M.V. *Condesa.* Captain H. Heal. Cape Town to Melbourne. Observer, Mr. S. Edgington, 2nd Officer.

8th July, 1950, 1315 G.M.T. The vessel passed through a tide rip in the form of roughly a straight line, running about 090°–270° and extending to the horizon in each direction. The sea temperature fell from 70°F. to 68° after crossing the line. Course 103° (T), speed 12·8 knots.

Position of ship: 36° 07'S, 24° 30'E.

*Intensity 6. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.

Straits of Gibraltar

S.S. *Himalaya*. Captain H. C. C. Forsyth. Southampton to Casablanca. Observer, Mr. C. Barrett.

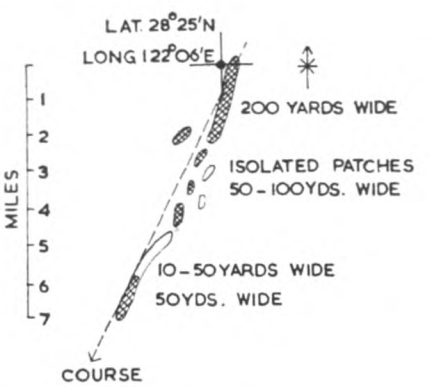
30th July, 1950, 2020 B.S.T. Off Tangier Bay we passed through a very pronounced tide rip running in a NW–SE direction, about 100 yards wide. There was no wind and the sea was flat calm. The sea in the rip was very confused and choppy. The rip showed up on the radar screen as a very distinct line and great difficulty was experienced with the steering when entering it, as much as 30° of helm being required to keep the ship on her course.

DISCOLOURED WATER

East China Sea

S.S. *Hupeh*. Captain J. Warrior. Tientsin to Hong Kong. Observer, Mr. J. R. Suffren.

17th July, 1950, 0550–0635 G.M.T. Patches of discoloured water were observed as shown in the accompanying sketch. The shaded portions in



the sketch indicate a deep red-brown colour and the unshaded a light to medium red-brown. The edges of the large patches were a greenish-brown colour. Air temp. 85°F., sea 84°. Wind 080°, 9 knots; swell 175°, moderate to low; sea, slight.

Position of ship: 28° 25′N, 122° 06′E.

PHOSPHORESCENCE

Arabian Sea

M.V. *Caledonia*. Captain E. Stormont. Bombay to Karachi. Observer, Mr. T. L. Langlands, 2nd Officer.

8th August, 1950, 2003 G.M.T. The sea was wholly covered with bright, flashing, closely spaced patches of phosphorescence. They took the form of circles about 30 ft. in diameter and oblongs 30 ft. by 10 ft. The patches " flashed " alternately and gave the appearance of the whole sea shimmering with lines of light running criss-cross in all directions. The wind was WSW, force 3, with moderate sea and swell. Air temp. 81°F., sea 82°.

Position of ship: 24° 04′N, 66° 32′E.

Note.—This is not a very common type of phosphorescence, but it is known to occur at times and several previous observations were published in pre-war volumes of *The Marine Observer*.

M.V. *Caledonia.* Captain E. Stormont. Karachi to Aden. Observer, Mr. A. Macadam, Junior 3rd Officer.

11th August, 1950, 1540 G.M.T. During the hours of darkness the surface of the sea was covered with a milky phosphorescence. The strength of the illumination was such that the tops of the breaking seas were indiscernible, the sea appearing perfectly smooth, although there was a strong breeze and a heavy SW'ly sea and swell running. The following night the same phenomenon was observed, but the strength of the illumination was greatly reduced. Air temp. 78°F., sea 78°.

Position of ship: 19° 34'N, 60° 08'E.

S.S. *Karanja.* Captain J. W. Milne. Karachi to Mombasa. Observer, Mr. G. C. Johnson.

12th August, 1950, 1800 G.M.T. The sea was observed to glow with an even luminosity. No globules of phosphorus were observed and the luminosity continued for about two hours, a distance of some 25 miles. White foam appeared black on the pale-green background of the sea. Position of ship: 14° 43'N, 60° 46'E. The phenomenon occurred again on the 13th at 1800 in 10° 53'N, 57° 32'E.

M.V. *British Respect.* Captain W. Hill. Abadan to Suez. Observers, Mr. G. Barber, 2nd Officer, and Mr. W. Johnston, 3rd Officer.

13th to 15th August, 1950. Unusual phosphorescence was observed during the night and early morning while proceeding along the Arabian coast between Masira Island and Khabilya Island. The sea at the time was one sheet of glowing light, the colour of milk, reaching from horizon to horizon, giving the impression that we were proceeding across a huge flat field of snow. Although the sea was breaking heavily at the time the wave crests became invisible, and the phenomenon created the impression of a flat calm. Occasionally a wave crest would appear as a line of electric-blue fire. So marked was the difference between the sea and sky, which was lightly clouded at the time, that the horizon was clearly defined and it would have been a simple matter to have taken star observations. The phosphorescence lasted for several hours at a time.

Note.—The calming of a rough sea during a display of phosphorescence is frequently mentioned in reports. In the above observations the remark about the tops of the breaking seas being invisible, owing to the general sea illumination, is interesting. It shows that, in some cases at any rate, the calming effect is an illusion.

S.S. *Clan Chattan.* Captain H. C. Simpson, O.B.E. Tuticorin to Aden. Observer, Mr. G. A. Berry, 2nd Officer.

15th and 16th August, 1950. During the night watches the sea, from horizon to horizon, appeared to be illuminated from beneath. The effect was that of a snow-covered field, with the sky, although clear, showing dark against the water. The source of the illumination was evidently entirely on the surface, as dark patches showed through where the water was disturbed by the movement of the ship. The phenomenon was first noticed at 2200 G.M.T. on the 15th, persisting until daylight, and was observed again on the 16th from sunset to sunrise.

Mid-position of ship: 11° 05'N, 62° 35'E.

Seven other ships also reported "white water" in the Arabian Sea as follows:
13th August, 1950, T.S.S. *Esperance Bay* (11° 10′N, 61° 38′E);
14th August, 1950, S.S. *British Statesman* (16° 56′N, 56° 05′E);
17th August, 1950, S.S. *Indian Endeavour* (11° 20′N, 62° 38′E);
17th August, 1950, S.S. *Jehangir* (16° 58′N, 63° 15′E);
18th August, 1950, S.S. *Indian Endeavour* (12° 32′N, 59° 45′E);
20th August, 1950, M.V. *Chinese Prince* (11° 35′N, 60° 13′E);
21st August, 1950, S.S. *Orbita* (11° 44′N, 60° 42′E).

New Zealand Waters

M.V. *Port Pirie*. Captain F. W. Bailey, M.B.E. Lyttelton to Panama. Observer, Mr. W. A. Wakefield, 4th Officer.

8th September, 1950, 0830 G.M.T. The vessel passed through what appeared to be a shoal of phosphorescent fish, tubular in shape, about 12 in. to 18 in. long and 3 in. in diameter, both surfaced and submerged. The light, varying in intensity from bright to extremely bright, was visible at a distance of some 200 ft. The phenomenon was observed over a period of 40 minutes. Course 052° (T). Speed 16 knots.

Position of ship: 39° 30′S, 179° 38′E.

TROPICAL STORMS

North Atlantic Ocean

M.V. *Port Lincoln*. Captain G. C. Langford. London to Curaçao. Observer, Mr. V. G. K. Webster.

13th August, 1950, 1615 G.M.T. Position 23° 38′N, 62° 18′W. Bar. 1012·7 mb., falling fairly rapidly. Wind 120°, force 7. Swell 120°, 13 ft. Air temp. 78°F. Wind and swell both rising. Mainly overcast with frequent rain squalls.

2115. Position 23° 04′N, 62° 51′W. Bar. 1001·7 mb. Barograph trace dropping vertically. Wind 060°, force 8. Swell 090°, 16 ft., short and steep. Overcast with torrential rain which had started at 1830. Visibility very poor.

2145. Wind 060°, force 10, in fierce squalls. Visibility very seriously affected by torrential rain and spray. Vessel rolling violently.

2215. Position 22° 45′N, 63° 09′W. Bar. stopped falling at 995·8 mb. and the wind dropped quickly to force 3 and began to veer. Swell becoming confused and moderating rapidly. Rain had ceased but there was a ring of dark clouds all round the horizon. Blue sky overhead interspersed with Ac, As, Ci and Cs. Yellowish tinge becoming apparent. Good visibility.

2315. 999·0 mb. rising rapidly, though not quite as fast as the previous fall. Wind had settled at 240°, rapidly increasing to force 7. Swell moderate. Overcast (Fc, Fs) with moderate visibility. No rain. Everything tinged a gloomy yellowish-brown. The centre took approximately 70 minutes to pass over the vessel. Course 223°, 14 knots during that time.

0015. Position 22° 32′N, 63° 20′W. Bar. 1001·6 mb. rising rapidly. Wind 250°, force 8. Swell moderate, confused. Sky overcast.

From then on the weather moderated rapidly with few showers. None of the usual indications of a tropical storm were apparent on the morning of the 13th, with the exception of the barometer, which had remained steady and showed no diurnal range. The wind, which had been E'ly, force 4, freshened and could have been normal fresh to strong trades.

Note.—This observation has been referred to the Chief of the U.S. Weather Bureau.

South Pacific Ocean

M.V. *Levernbank*. Captain D. Gillies. Panama to Brisbane. Observer, Mr. D. Moore, 3rd Officer.

13th September, 1950, 1200 G.M.T. The wind was E'ly, force 6, and the barometer, falling rapidly, read 1006·4 mb. By 1930 the pressure had fallen to 983 mb., the lowest recorded value, and the wind had backed to NE. The wind had increased to NW'W, force 12, at 2100 and the air was filled with drifting spray. The sky was clouded with As except for a clearance between NNE and E, reaching an altitude of about 20°. The pressure read 986·3 mb. and was rising. By 2215 the wind was SW, force 8, with the barometer reading 989·4 mb. and steadying. The sky was covered with thick As. At 2300 the wind was S, force 6, and by 0030 on the 14th had increased to force 8 with occasional heavy rain. The wind continued to blow from the S, increasing to force 11 at 0600 and moderating after 1100, becoming force 8 by 1200, when the barometer read 1004·0 mb.

The ship was hove-to from 1830 on the 13th until 2000 on the 14th. Heavy seas washed away the chocks and shifted No. 4 lifeboat up against the accommodation and stove in one side. The B.O.T. gangway and accommodation ladder were smashed, one section being washed overboard. Two sections of rails and stanchions were wrenched off the deck and badly bent. The log boom was buckled and port glasses cracked. No. 4 hatch cover (top) was torn to pieces.

Position of ship at 1830 on 13th: 23° 28'S, 169° 35'E. At 2000 on 14th: 25° 31'S, 168° 11'E.

Note.—This observation has been referred to the Director.

HEAVY SQUALL WITH WATERSPOUTS

Red Sea

M.S. *Auricula*. Captain H. Sangster. Suez to Mena Al Ahmadi. Observer, Mr. P. M. Thorp-Hincks, 2nd Officer.

26th July, 1950, 0920 G.M.T. Whilst approaching Jabal Atair Island (15° 33'N, 41° 50'E) a large Cb was observed. At 0925, three spouts formed near the island (Fig. 1). 0930: Wind SW, force 3. Temp. 84°F. 0933: Wind

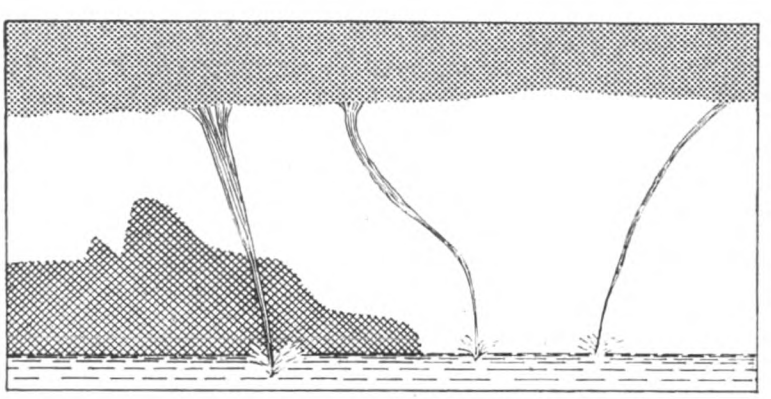


Fig. 1

SW, force 6, veering all the time until it reached hurricane strength. The pressure had fallen 5 mb. and the temperature 16°. A squall was observed 4 points on the starboard bow. 0940: The wind had backed to 090°, force 10,

and began to veer S (see Fig. 2). 0945: Crossing eye of the squall. No wind. Short, shallow, rippling swell. 0955: Wind 160°, force 12. Swell had deepened. Raining heavily. The wind continued to veer to S until it

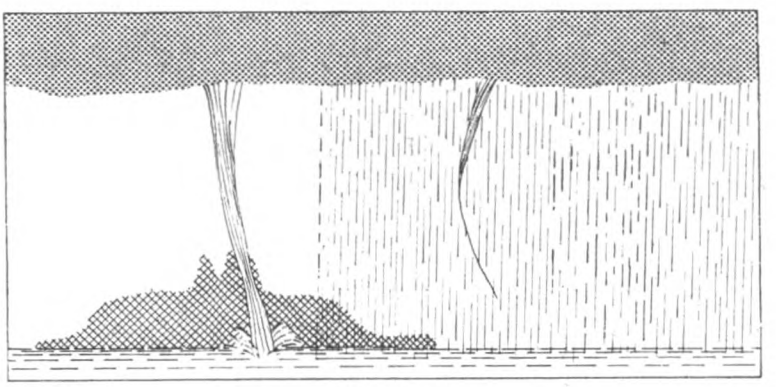


Fig. 2

decreased to a fresh SW breeze. The pressure had risen 8 mb. 1000: Cloud 8/8 As and small amounts of Cb. Showers of short duration. Pressure steadying. Good visibility. 1600: Pressure falling slowly. Wind NE. Sea and swell moderate.

PHENOMENAL STORM

Red Sea

S.S. *Canton.* Captain G. Stable. Observer, Mr. R. Raw.

7th August, 1950, 1740 G.M.T. In position 19° 46′N, 39° 05′E, the following conditions were recorded: light W'ly wind, bar. 29·82 in., temp. 88°F. Overcast. At 1840 (19° 34′N, 39° 11′E) the wind was backing and strengthening and distant lightning was observed between S'E and SSW.

At 2010 (19° 06′N, 39° 26′E) the wind had risen to SE, force 6, with a rising barometer and decreasing visibility. By 2040 (18° 57′N, 39° 30′E) the wind had increased to S'E, force 9, and torrential rain with vivid lightning was experienced. The barometer was falling rapidly. At 2055 the wind veered to WSW, force 5, with heavy rain showers, and at 2110 backed to SE'S, force 3, with rising barometer and full visibility. By 2140 the wind was SSW, force 2. Bar. 29·84 in. Temp. 80°.

Note.—The observations of M.S. *Auricula* and S.S. *Canton* are very interesting, since it is stated in the Red Sea and Gulf of Aden Pilot that gales are exceedingly rare in the Red Sea in the south-west monsoon season. The storm experienced by S.S. *Canton* resembles the thunder squalls, with winds up to force 10, which occur in the Red Sea between lat. 19° and lat. 22°N. These, however, are stated in the Pilot to occur in the north-east monsoon season.

ARCHED SQUALL

North Atlantic Ocean

M.V. *Sutherland.* Captain R. W. Nicolson. Liverpool to Adelaide. Observer, Mr. G. Galloway, 2nd Officer.

4th July, 1950. A well-defined arched squall of low Fs and Fc was observed four points on the port quarter, ship steering 143° (T). Wind 270°, force 3. Bar. 1014 mb. Temp. 80°F. Wet bulb 77°. Slight sea, moderate N'ly swell. Distant lightning.

At 0225 the wind veered sharply to 080°, increasing to force 7, the temperature falling to 76°; depression of wet bulb 1°. Torrential rain started at 0230 accompanied by vivid lightning and the barometer started falling sharply. At 0235 the whole sky was overcast and the wind moderated to force 5. These conditions persisted until 0255 when the wind veered to 180° and the rain became moderate. The barometer had fallen to 1009·1 mb. At 0500 the barometer began rising and the wind veered to 210°, force 3, the depression of the wet bulb being 2°. The squall receded to the SW and by 0530 conditions were normal, although the sky remained clouded with Sc and Cu. Wind 200°, bar. 1011 rising. Air temp. 78°. Wet bulb 65½°. Before the squall the wind had been W–NW'ly and afterwards became S–SW'ly until the 6th July when the SE trades commenced.

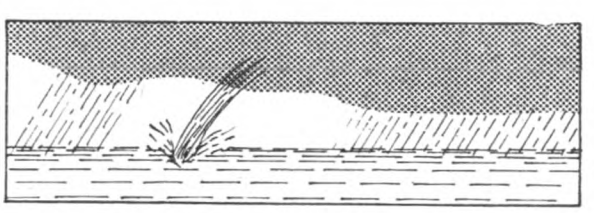
Position of ship on 4th: 11° 30′N, 17° 50′W.

WATERSPOUTS

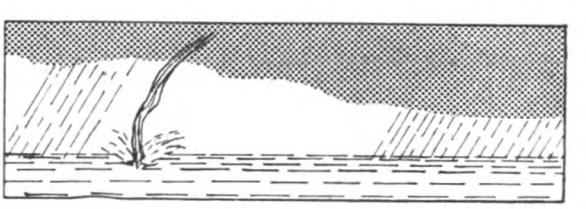
North Pacific Ocean

S.S. *Loch Avon.* Captain C. E. Mason. North Pacific coast to United Kingdom. Observer, Mr. R. J. Stapleton, 3rd Officer.

8th September, 1950, 1535 G.M.T. A waterspout was observed bearing 060° at about 10 miles distance. The sky was heavily overcast at the time with a thunderstorm approaching from the SE. When first sighted, the spout had extremely well-defined outlines and appeared to be of a very solid nature, the head reaching for a fair distance up into Cb cloud. The curve became more pronounced during the various stages and after 11 minutes,



1535 G.M.T.



1546 G.M.T.

when the funnel began to grow thinner, several kinks were noted along its length. Heavy rain was falling on either side. At 1548 the spout collapsed along its entire length and dissolved. During the whole period, heavy spray was observed around the base of the spout.

Air temp. 80°F. Wet bulb 76°. Sea 81°. Clouds: 3/8 Cb, 1/8 Cu, 4/8 Ac.

Position of ship: 9° 14′N, 85° 53′W.

Arabian Sea

S.S. *Martand.* Captain T. Fox Lloyd. Colombo to Aden. Observer, Mr. J. Robertson, 3rd Officer.

26th September, 1950, 1800 G.M.T. The vessel passed within 100 ft. of a waterspout, which was observed in bright moonlight. The spout extended from the base of a Cb, estimated to be at 500 ft., to cloud of spray and disturbed water at the surface of the sea. The disturbed water was visible at a quarter of a mile, but the actual spout, a narrow S-shaped column approximately 6 ft. in diameter, was not seen until the vessel was 400 ft. from it. The spout appeared to be practically stationary and rain was seen falling from the same Cb cloud half a mile to the NW.

Position of ship: 10° 05′N, 61° 59′E.

LIGHTNING

North Atlantic Ocean

S.S. *Argentina Star*. Captain D. R. Macfarlane, O.B.E., D.S.O. Rio to London. Observer, Mr. M. Slessor, 3rd Officer.

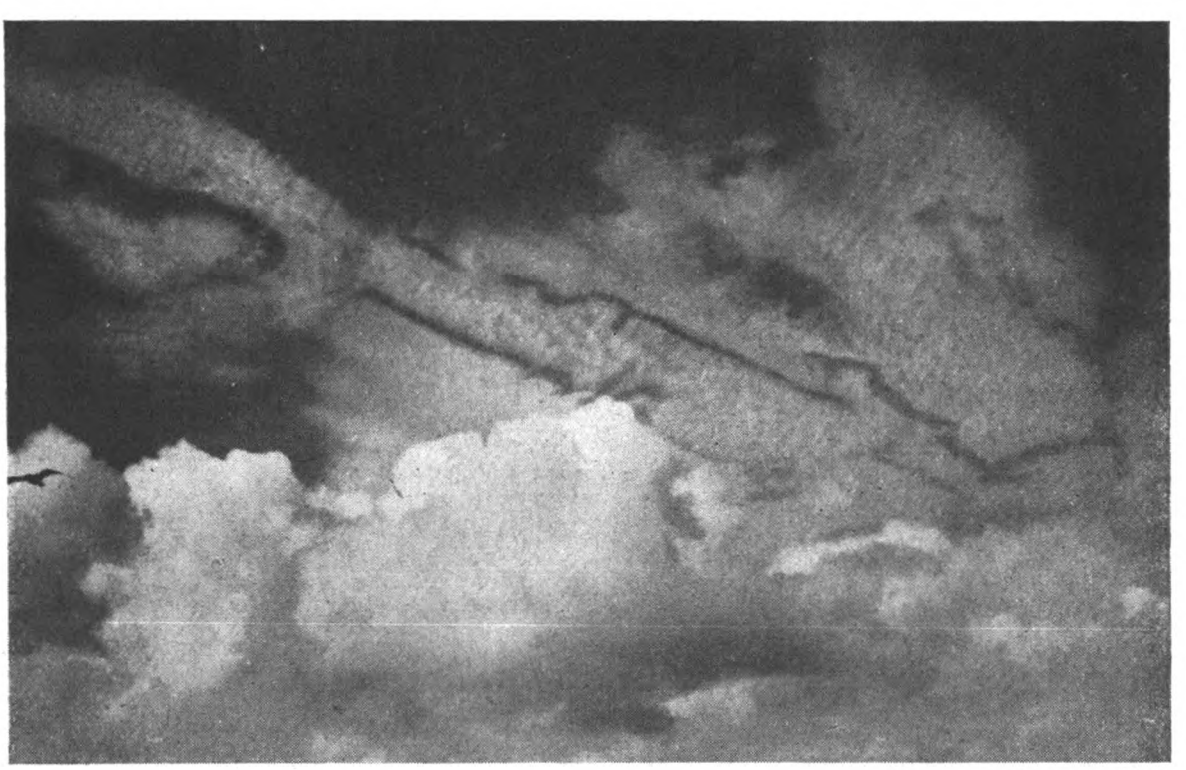
22nd September, 1950, 0300 S.A.T. A very extraordinary display of ball lightning was seen. This was preceded by occasional flashes of lightning below the E horizon which started about 0030, the lightning gradually moving through N towards the W until the whole semicircle of horizon E–N–W was lit up by low flashes of lightning. Black clouds began to form very low on the horizon in the same semicircle, leaving the rest of the sky clear. Slowly the clouds moved from N–S until at 0300 they were over the ship, and at this time the lightning, which had been becoming more frequent, seemed to burst all around the ship with a tremendous intensity which lasted for about 15 minutes, then passed over to the S. The display was succeeded by torrential rain with no change in wind force and no apparent change in pressure. The sky gradually cleared after the rain, though a few slight showers were experienced in the next watch. Wind, light N'ly. Sea smooth. Air temp. 83°F., sea temp. 81°.

Position of ship: 15° 00′N, 22° 05′W.

UNUSUAL CLOUD FORMATION

Firth of Clyde

O.W.S. *Weather Recorder*. Captain A. W. Ford. Greenock to " ITEM ". Observer, Mr. M. L. Jinks.



[*Photograph by M. L. Jinks*

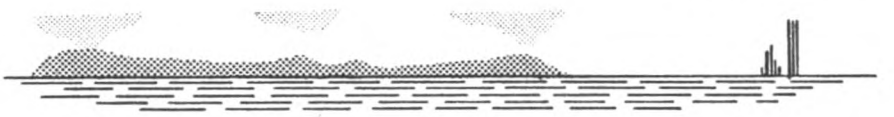
28th July, 1950, 1740 G.M.T. The accompanying photograph was taken from a position near Ailsa Craig. The weather was partly cloudy, with 4/8 Cu and 2/8 Cc. The surface wind was 200°, 8 knots.

ABNORMAL REFRACTION

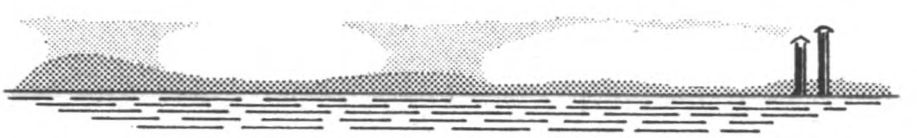
Off Coast of Nova Scotia

S.S. *Valacia.* Captain J. G. Bradley, R.D., R.N.R. Halifax to Montreal. Observer, Mr. A. R. M. Graham, 3rd Officer.

1210 G.M.T. (0910 local time) Egg. I. Lt. House
Dist. 18 miles



1220 G.M.T. (0920 local time) Dist. 16 miles



1240 G.M.T. (0940 local time) Dist. 12 miles

21st July, 1950, 1200 G.M.T. (0900 local time). Leaving Halifax for Montreal, considerable refraction was observed along the coastline, while ships on the seaward horizon appeared normal (see sketches). At the same time an off-shore breeze was clearly noticeable at an altitude of about 100 ft. in direct opposition to the wind at the sea surface. Air temp. 62°F., sea 57°'

Gulf of St. Lawrence

S.S. *Norwegian.* Captain A. L. Hunter. Port Alfred to Swansea. Observer, Mr. J. Hunter, 2nd Officer.

2nd August, 1950. The planet Venus was observed bearing 054° at 2° 23′ altitude. It closely resembled an occulting red and white light with both colours separate and distinct, changing with one colour merging into the other, as is often the case when passing over the red and white sectors of a shore light.

Position of ship: 49° 48′N, 64° 37′W.

LUNAR RAINBOW

Australian Waters

M.V. *Sutherland.* Captain R. W. Nicolson. Liverpool to Adelaide. Observer, Mr. G. Galloway, 2nd Officer.

4th August, 1950, 1748 G.M.T. A lunar rainbow was observed. The full arc was clearly visible, the bases bearing 190° and 270°. The colours green, yellow and red could be seen near the centre, with variations of grey at the

inner and outer circumferences. The moon was bearing 056°, approximate altitude 32°, the breadth of the bow subtending an angle of 48′. Sky, 3/8 Sc, 1/8 Ac. No precipitation was visible at the time of the observation but a heavy rain shower was experienced some 50 minutes later.

Position of ship: 35° 36′S, 113° 06′E.

MAUVE SUN

North Atlantic Ocean

S.S. *Manchester Progress*. Captain W. H. Downing. Montreal to Manchester. Observer, Mr. L. Taylor, 2nd Officer.

25th September, 1950, 1420 G.M.T. The sun appeared almost white through a thin veil of St. By 1500 it appeared mauve, having gradually changed in colour, being very clear-cut and easily observed without the use of coloured shades. The sky was thinly veiled by As. The colour deepened to a pronounced mauve as the sun passed the meridian. By 1515 the sky was thickly overcast and the sun was finally obscured, the sky gradually darkening from the NW to the NE. At 1700 the whole northern half of the sky was illuminated, appearing a biscuit colour. Cu and As clouds appeared a smoky red as if huge fires were raging in the distance. This effect persisted until 1815 with a clear horizon all round. The wind was variable W'ly, force 3. Air temp. 47°F. Wet bulb 46°.

Position of ship: 54° 02′N, 46° 13′W.

Note.—An article on the blue sun and moon seen in Western Europe the day after the above report is on page 167.

AURORAE

Indian Ocean

M.V. *Port Phillip*. Captain J. G. Lewis, O.B.E. Cape Town to Adelaide. Observer, Mr. T. A. Fairbairn.

21st July, 1950, 1945 G.M.T. Aurora was observed with centre bearing 170°, slowly increasing in brightness until the Cu clouds were given a strong outline and the star Tureis (ι Argus) with an altitude of 10° was dimmed. At 2000 a weak white beam like a searchlight was thrown out at an angle of 70° to the horizontal, reaching an altitude of 7° and lasting for six seconds. The light then faded until at 2017 it finally disappeared.

Position of ship: 42° 11′S, 91° 28′E.

North Atlantic Ocean

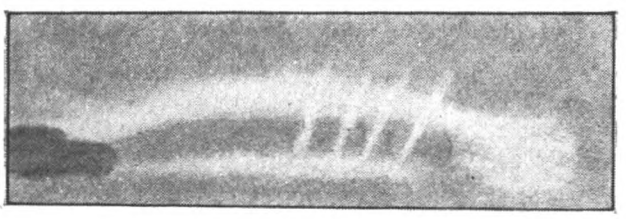
S.S. *Newfoundland*. Captain C. H. Kenyon. Liverpool to St. Johns. Observer, Mr. E. W. Foxworthy, 3rd Officer.

15th August, 1950, 0030 G.M.T. Aurora appeared as a narrow arc of white light along the top edge of Cs cloud on the N horizon, from which a series of vertical lines of greenish-white light of varying intensity radiated to a maximum altitude of about 20°. The aurora was visible between 325° and 045° and the altitude of the top edge of the Cs was about 8°. Visibility was excellent and the sky 1/8 covered with Cs, all situated on the N horizon below 8° altitude.

Position of ship: 48° 15′N, 50° 09′W.

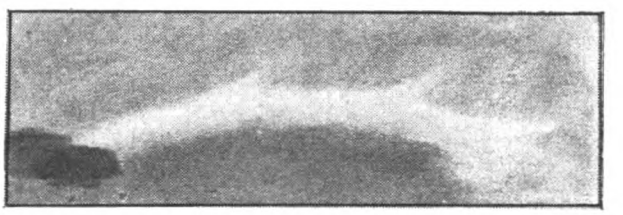
Indian Ocean

S.S. *South Africa Star*. Captain R. White. Cape Town to Sydney. Observer, Mr. W. V. L. Burne, 3rd Officer.



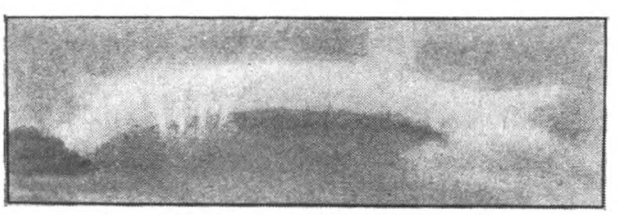
E W

1430 G.M.T. Max. altitude 33°



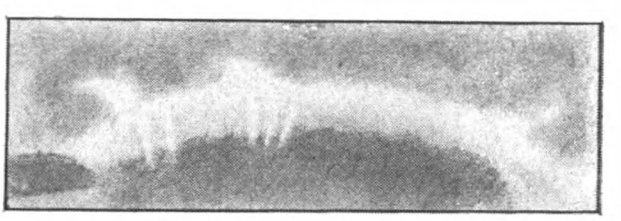
E W

1445 G.M.T. Max. altitude 28°



E W

1453 G.M.T. Max. altitude 28°

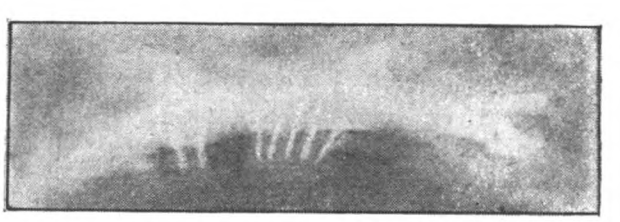


E W

1500 G.M.T. Max. altitude 26°

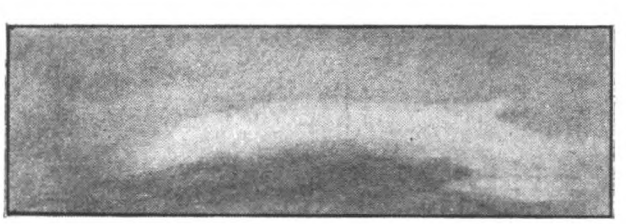
E W

1515 G.M.T. Max. altitude 32°



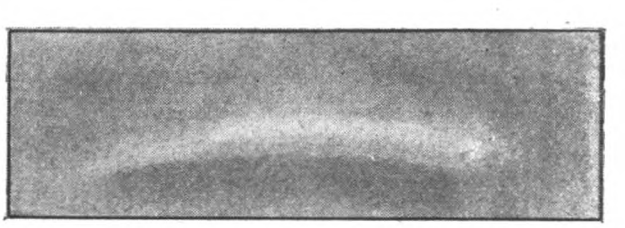
E W

1530 G.M.T. Max. altitude 30°



E W

1545 G.M.T. Max. altitude 28°



E W

1600 G.M.T. Max. altitude 25°

19th August, 1950, 1430–1640 G.M.T. The sketches were made at intervals up to 1600. At 1620 the appearance was similar to that at 1600 but stronger, at a higher altitude and showing a definite green tint. Bright rays appeared periodically, mainly in the central and western sections of the bow. At 1640 the aurora appeared as an arc of diffuse grey-green light to the S, bright in the E, fading to the W, with occasional bright beams of light reaching approximately 30°. The phenomenon was fading rapidly and at the same time was being obscured by a layer of Ac encroaching from the W.

Position of ship at 1200: 38° 32′S, 99° 58′E; at 1800: 38° 34′S, 100° 47′E.

North Atlantic Ocean

S.S. *Essex Trader*. Captain D. G. Evans. Liverpool to Hudson Bay. Observer, Mr. D. Harris, 2nd Officer.

19th August, 1950, 0100 G.M.T. An exceptionally brilliant display of aurora was observed, first appearing as a wide band of light stretching right across the sky from E–W, seeming to originate in the E, where the light was most brilliant. In a short while this band widened and then broke up into numerous ribbons of light forming a complicated and serpentine pattern, gradually spreading out into fan-shaped bundles of rays with the phenomena known as " merry dancers " much in evidence. At 0140, with a decrease in the cloud amount, the display was at its brightest, covering the whole sky from the SW through N to E. From 0200 onwards the observation was interrupted by the increasing cloud, but the aurora could still be seen in part and the continuous flashing wave-like motion of the rays as they darted towards and retired from the zenith was very noticeable. By 0345 the aurora was fading and by 0400 had disappeared.

Position of ship: 57° 20′N, 18° 00′W.

R.M.S. *Caronia*. Captain D. W. Sorrell. Le Havre to New York. Observer, Mr. P. Jolliffe, Senior 3rd Officer.

19th to 20th August, 1950. A brilliant display was observed lasting throughout the hours of darkness until two hours before dawn on the 20th. The whole northern sky was illuminated from the horizon to the zenith, from whence streams of light of about 5° in width played steadily over the northern sky. Toward morning the effect was that of high white flickering cloud filling the northern sky, the southern sky having cleared. Magnetic compasses were normal throughout.

Position of ship at 0600 on 20th: 42° 55′N, 50° 33′W.

M.V. *Drina*. Captain D. R. Miller. London to Bermuda. Observer, Mr. N. J. Oliver, 3rd Officer.

20th August, 1950, 0100 G.M.T. About two hours after sunset aurora formed in the northern sky. Beams of light, slightly fan-shaped, were observed all round the horizon between 320° and 020°, the maximum altitude being about 25°. During the first 15 minutes the beams were very clear-cut and distinct, but later began to fade. A bright glow remained for about two and a half hours with beams of varying brilliancy appearing intermittently, and at 0315 clear-cut bright beams appeared between the same bearings and with the same maximum altitude, lasting for about 10 minutes, after which the beams disappeared and the sky gradually darkened. Medium- and long-wave radio reception appeared unaffected, but short-wave reception of British stations was exceptionally poor, although Cape Town and Buenos Aires remained quite good.

Position of ship: 33° 25′N, 59° 10′W.

S.S. *Ceramic*. Captain A. V. Richardson. Curaçao to Liverpool. Observer, Mr. B. H. Clarke-Lens, 3rd Officer.

20th August, 1950, 0050 G.M.T. Aurora in the form of draperies and

curtains was seen bearing 290°–020° (T), lasting until 0110. Beams of light rose vertically from behind Cu on the horizon to an altitude of 20°–35°. Light was seen in rapid motion over an arc of the horizon. After the beams had disappeared a white glow remained until 0130. No colours were observed throughout the display.

Position of ship: 35° 44′N, 45° 00′W.

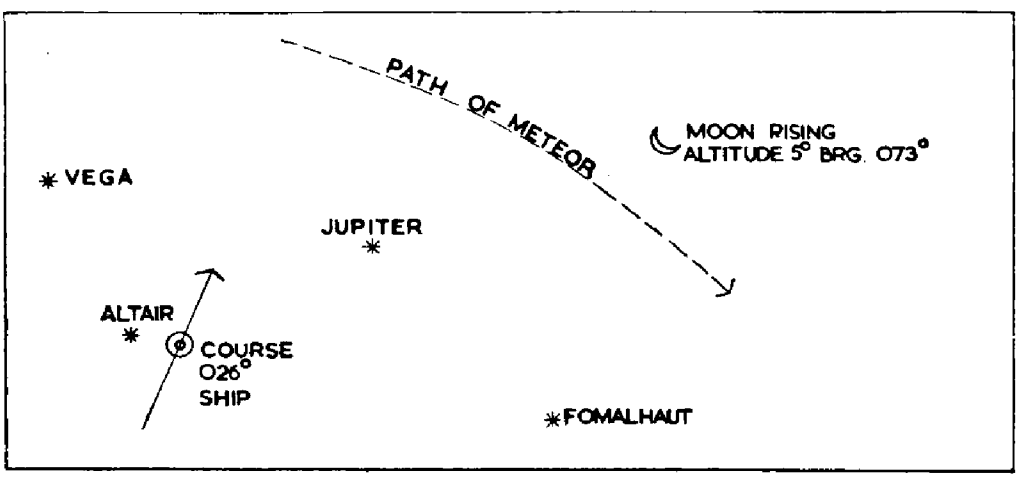
Aurorae were also reported on 20th August in the North Atlantic by S.S. *Consuelo* (41° 10′N, 64° 40′W) and by S.S. *Balantia* (44° 22′N, 41° 39′W)

METEORS

North Atlantic Ocean

M.V. *Deseado.* Captain S. J. G. Hill. Rio to Las Palmas. Observer, Mr. P. C. T. Davies, 2nd Officer.

7th July, 1950, 0212 G.M.T. A bright meteor of magnitude about –2·0 was observed travelling in an E-S direction over a period of 6 to 7 seconds. At an altitude of 30°, bearing 070°, it passed behind As cloud, where it increased in brightness considerably for about 1 to 1½ seconds.



Referring to a star chart, it was decided that the meteor appeared at β Cygni and disappeared at Markab. The trail showed a reddish tinge, which disappeared on " entering " the cloud and was no longer visible on " emerging."

Position of ship: 1° 40′N, 28° 28′W.

Gulf of Mexico

M.V. *Silversandal.* Captain G. F. Chivers. Panama to Houston. Observer, Mr. G. F. Lightfoot.

2nd September, 1950, 0910 G.M.T. A very brilliant meteor appeared just below the star Pollux at an altitude of about 15°, bearing 065°, and disappeared at an altitude of about 12°, bearing 035°. The trail was very short, subtending roughly 3°–4°, with a brilliance twice that of Sirius, which was visible to the SE. The time of flight was about six seconds.

Position of ship: 25° 47′N, 90° 00′W.

South African Waters

M.V. *City of Lille.* Captain W. A. Owen. Beira to Durban. Observer, Mr. J. B. Jones, 3rd Officer.

21st September, 1950, 2050 G.M.T. A meteor of exceptional size and brilliance was observed. It appeared in the vicinity of Fomalhaut (altitude approximately 85°) and fell with fluctuating magnitude until disappearing with a flash near α Triangulis Australis (altitude 20° approximately). The time of flight was 3 or 4 seconds and the meteor travelled at an angle of about 5° to the vertical, E–W. It was of an unusual character, being similar to a rocket flare and about three times the size of the planet Jupiter.

Position of ship: 28° 22′S, 32° 36′E.

NIGHT SKY PHENOMENON

Mediterranean Sea

M.V. *Denbighshire.* Captain D. Hey. Port Said to Genoa.

24th July, 1950, 2030–2100 G.M.T. The third mate, midshipmen and later the master, observed a number of flares in the northern sky between the bearings 360° and 050°. They simulated star shells, but neither reports nor gunfire were heard. There were a number in the sky together at various times, having the appearance of a salvo of shells, and seeming to hang in the air for as long as a minute.

Position of ship: 32° 12′N, 30° 00′E.

BLUE SUN AND MOON

BY G. A. BULL, B.SC.
Meteorological Office Library

Over much of western Europe between 26th and 30th September, 1950, the sun and moon were seen blue in colour.

The first reported observation of the " blue " sun in Europe was made from Bwlchgwyn, near Wrexham, Denbighshire, very soon after sunrise on the morning of 26th September. The sun was obscured by cloud soon after this observation was made and was not seen again during the day. Over the western and northern parts of the British Isles there was too much low cloud on the morning of the 26th for the sun to be seen.

After mid-day the clouds began to break over Scotland, and the phenomenon was seen from most places in that country. Later in the afternoon it was seen from Wales and western England.

The colour assumed by the sun was variously described from steely-grey to deep blue, royal blue or purple. An observer at Glasgow said the sun appeared as it does through the deep-blue anti-glare glass used in motor-cars. The brightness of the sun was diminished to such an extent that it could be watched continuously without discomfort. In fact some persons who telephoned the Meteorological Office in Edinburgh during the afternoon were uncertain whether they were looking at the sun or the moon.

The sun, except for the colour, appeared as it does when shining through thin altostratus. The disc of the sun was quite sharp and there was no sign of corona or halo. The attention of some people was directed to the sun by noticing that the " rays " shining into rooms were blue.

On observing the phenomenon Mr. Bothwell, the meteorological officer at Leuchars, arranged for an aircraft to ascend to report on the change in colour with height. The pilot of the aircraft, F/Lt. West Jones, reported as follows:

1549 hours: 31,000 ft.: (sun) still blue entering cloud of brown haze colour.

1554 hours: 38,000 ft.: nearly through cloud which obscures land, sun normal colour, tinged with blue.

1558 hours: 43,000 ft.: above cloud, sun normal colour.

The pilot of an aircraft flying near Cambridge at 0715 hours on 27th September reported encountering brown haze with a smell of burnt paper at 30,000 ft. to 32,000 ft.

The pilots of some aircraft flying the Atlantic made similar observations. Thus, the pilot of aircraft CFTFM reported to Prestwick that he passed through thick smoke between 0500 and 0600 hours on 26th September at 17,000 ft. in lat. 59°N, long. 35°–25°W, and had to use instruments because of the poor visibility. A pungent smell suggestive of forest fires came into the aircraft.

On the following night the moon had a green or blue tinge as seen from the British Isles, but the effect was less pronounced than with the sun. Mr. J. Paton writes that the moon as seen from Edinburgh was still bluish at 2330 hours on the 26th and normal at midnight.

Mr. R. J. Murgatroyd, of the Meteorological Office at R.A.F. Headquarters in Germany, reports that the sun was seen blue or mauve in colour over the British occupation zone in Western Germany from dawn on the 27th September until the afternoon. At Gatow, near Berlin, the sun was first seen " blue " about noon and the moon appeared " blue " throughout the following night, 27th to 28th September. From Schwechat (near Vienna) neither sun nor moon appeared " blue ".

A detailed report on the observations of " blue " sun at Gibraltar and the Atlantic to westward has been received from Mr. E. A. Ward of the Meteorological Office, Gibraltar. He writes that it was seen at 39° 40′N, 12° 20′W, on the 27th September by the pilot of the routine meteorological flight from Gibraltar, following descent to the 950 mb. level (approximately 2,000 ft.). From the 500 mb. level (approximately 18,000 ft.) an hour before, the sun had appeared normal. From Gibraltar itself the " blue " sun was first seen soon after dawn on 28th September and it retained its " blue " colour all that day. The coloration was most marked during the forenoon and evening and was faint in the afternoon. " Blue " sun was also seen on the morning and evening of 29th September and on the morning of 30th September. The sky at Gibraltar had a milky, or at times grey, appearance as though covered with a uniform sheet of high cloud which, owing to the absence of halo phenomena, was at first thought to be thin altostratus. This sheet persisted with occasional changes in density until the afternoon of the 30th, when it disappeared and the sun's colour returned to normal.

Mr. D. W. Johnston, Senior Meteorological Officer, Malta, reports that the sun was visible there on the 27th and 28th but was not " blue ". On the 29th and 30th the sky was almost continuously overcast, but when the sun partially broke through about 1600 hours on the 29th the sunshine seemed to be of a faintly bluish tinge.

According to the Press the "blue" sun was also seen on 27th September from France, Switzerland, Portugal and Scandinavia. It was widely observed in the eastern United States.

Canadian newspapers state that extensive forest fires broke out in Alberta some 340 miles northwest of Edmonton during Saturday, 23rd September. Smoke from these fires travelled eastwards, reaching Ontario, some 2,000 miles from the scene of the fire, by the afternoon of Sunday, 24th September. Over eastern Canada and the north-eastern United States the smoke clouds were thick enough to blot out the sun and to cause lights to be switched on in buildings and streets. Floodlights had to be turned on to allow baseball games to proceed. The base of the smoke cloud over eastern Canada was estimated at 7,000 ft.

There seems little doubt that the optical phenomena already described were produced by the same smoke after it had drifted across the Atlantic.

The observations of a milky haze rather like altostratus as seen from the ground, which appeared as a brown haze to the pilot of the aircraft over Leuchars, and the reports of smoke over the Atlantic support this view.

The upper-air charts for the relevant period show that the upper winds over the North Atlantic were favourable for carrying the smoke to Europe. A trajectory computed from the charts of the Daily Aerological Record, using winds at 750 mb. (approximately 8,000 ft.) over eastern Canada, 500 mb. (approximately 18,000 ft.) over the western half of the Atlantic and at 300 mb. (approximately 30,000 ft.) over the eastern half, brings the smoke to Scotland by the afternoon of the 26th September. The heights in the computation were varied to allow for the apparent ascent of the smoke layer as it travelled eastwards.

Precisely the same effects have been seen in the past, notably in the tropics after the explosion of Krakatau in 1883. A large number of occasions before 1887 of "blue" or "green" sun and moon, usually definitely connected with volcanic smoke, are on record. More recent reports of the sun being seen blue through dust storms in the U.S.A. and Egypt have been published. The sun has been seen blue and green through the steam cloud from a railway engine.

An optical theory of the "blue" or "green" appearance of the sun presents considerable difficulty and has not as yet been worked out.

Only one account of the phenomenon has been received from a ship at sea. This will be found in the "Marine Observer's Log" on page 163 of the present number.

LETTER TO THE EDITOR

Reflection of Rainbows

Sir,—The explanation you give on page 9 of the January, 1950, *Marine Observer*, about the reflection of rainbows from the sea surface is not entirely accurate when you state ". . . the apex of the reflection primary lies a little above that of the ordinary secondary bow".

The elevation of the apparent centre of the reflection bow equals the elevation of the sun in the case of a reflection from the sea. Hence the separation of ordinary and reflected bows varies with the position of the sun.

Taking the separation of the primary and secondary bows as 10°, the reflection bow will be within the secondary if the sun's elevation is less than 5°.

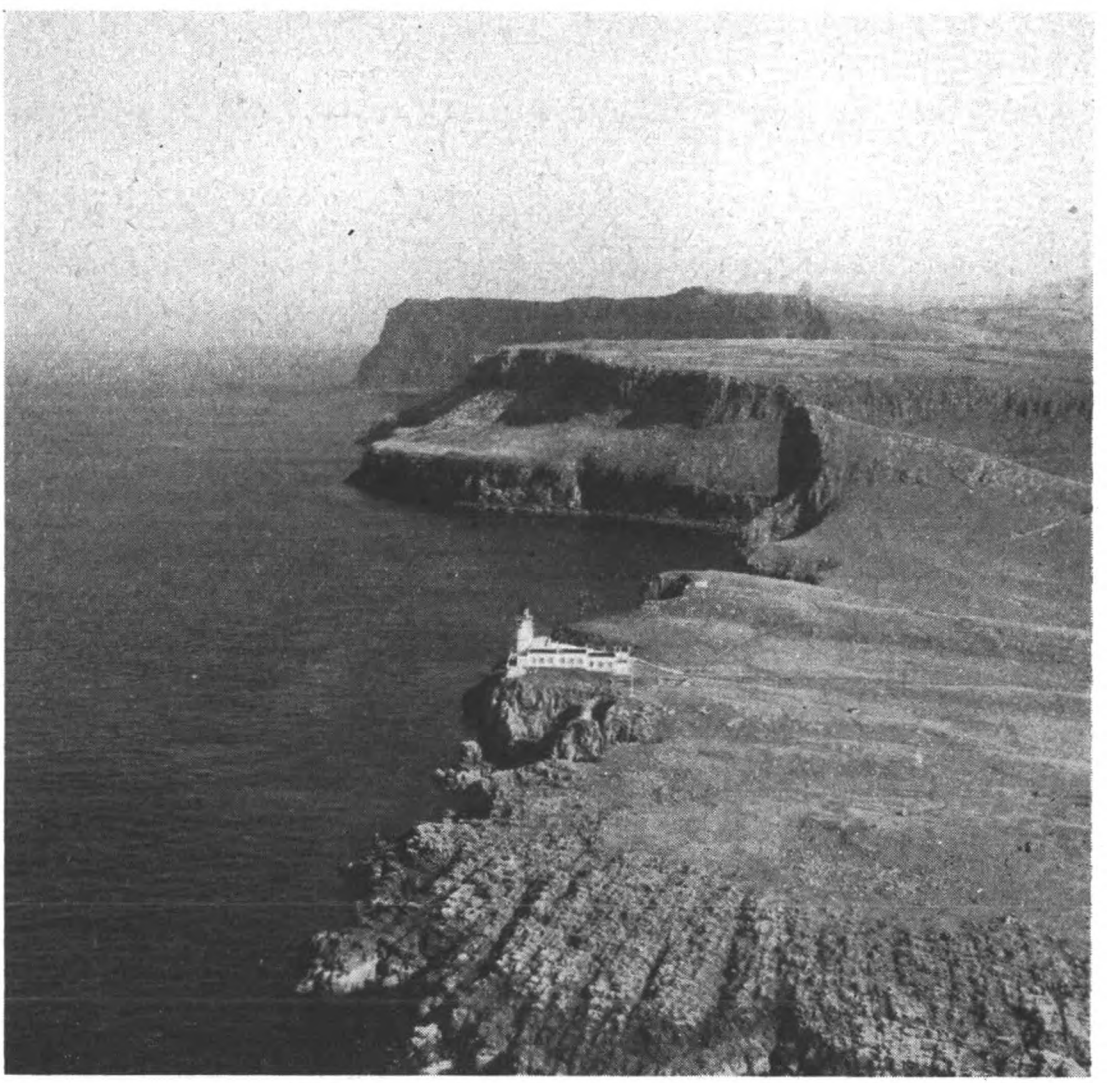
The smoothness of the water is also a major factor in the phenomenon,

and the reflected bow is generally less well-defined because the reflecting surface is imperfect.

Mona, St. Andrew, Jamaica. H. MYKURA.

Note.—We are grateful to Mr. Mykura for pointing out that the information given in *The Marine Observer*, January, 1950, is incomplete. The diagram there reproduced was taken from the one in Humphreys' *Physics of the Air*, third edition, 1940, page 498, omitting the reflection secondary bow, which is probably too faint to be ever seen. The fact that the relative positions of the reflection bows and the direct bows depend upon the sun's altitude is not directly stated by Humphreys though it can be inferred from the information he gives. In addition to the facts given by Mr. Mykura, it is interesting to note that when the sun's altitude is about 5° the apex of the reflection primary bow must coincide with that of the direct secondary bow. Furthermore, when the sun's altitude is 42°, the reflection primary bow will have risen so high in the sky that the lowest part touches the horizon, since it is centred on a point at an altitude of 42°. At this altitude the direct primary bow has become invisible, since its upper edge coincides with the horizon.

LIGHTHOUSES OF THE BRITISH ISLES



NEIST POINT

Neist (Ness) Point is the western extremity of the Isle of Skye (Lat. 57° 25′N, Long. 6°47′ W). The lighthouse, viewed here from the south, exhibits a group flashing light at a height of 140 ft. above high water

PLANETARY MOVEMENTS AND PHENOMENA

BY E. W. BARLOW, B.SC.
(Marine Branch, Meteorological Office)

In this article a short account is given of planetary phenomena, with special reference to the apparent movements of the five bright planets among the stars. The movements of the planets used in navigation, Venus, Mars, Jupiter and Saturn, will be found of interest if observed over a period of time. The short, but frequent, periods of the visibility of Mercury are also explained.

The Ecliptic

The Sun appears to move once round the heavens in a year. Its apparent path through the constellations is known as the ecliptic. Since the Sun's apparent motion during the year is due solely to the movement of the Earth once round its orbit, the ecliptic is the projection of the Earth's orbit upon the sky background.

The stars surrounding the Sun's position at any time cannot, of course, be directly observed, except in the short and infrequent periods of total solar eclipse. In ancient times an approximate idea of the Sun's path through the constellations was obtained by observing what is called the heliacal rising or setting of bright stars near the ecliptic. The heliacal rising of a star is when it rises a short time before the Sun, so that it is possible to see the star, if only for a few minutes, before its light is lost in the brightening twilight. Similarly, the heliacal setting of a star occurs when it sets very soon after sunset, but just long enough to become visible for a short time.

The Planets

The five bright planets, Mercury, Venus, Mars, Jupiter and Saturn, have been known since time immemorial. Long before it was discovered that these bodies, together with the Earth, revolved round the Sun, they were distinguished from stars by observing that they moved relatively to the stars, which remained fixed. The word " planet " is derived from a Greek word meaning " a wanderer ".

The five bright planets are those which are the Earth's nearest neighbours in the Solar System. Three more distant ones are now known, Uranus, discovered by Herschel in 1781, Neptune, discovered by Adams and Leverrier in 1846, and Pluto, discovered at the Lowell Observatory, in Arizona, in 1930. Of these, Uranus is just visible to the naked eye if its position is known, appearing as a small star of the sixth magnitude. Neptune is visible in a comparatively small telescope, but the observation of Pluto requires a very large telescope. These eight planets, together with the Earth, are called the major planets. In addition, the Solar System contains a multitude of small bodies, known as minor planets or asteroids, the orbits of the majority of which lie between those of Mars and Jupiter. Over 2,000 of these are known and new ones are continually being discovered. Only one of them, named Vesta, is just visible to the naked eye at times, but as in the case of Uranus, its exact position among the stars must be known beforehand.

Orbits of the Major Planets

The orbits of the major planets round the Sun are slightly elliptical, so that the distance of each planet from the Sun varies appreciably in the course of one revolution. The Earth is about 3,000,000 miles nearer the Sun in January than in July. The mean distance of the major planets from

the Sun, in millions of miles, is as follows: Mercury 36, Venus 67, Earth 93, Mars 141, Jupiter 483, Saturn 886, Uranus 1,783, Neptune 2,793, Pluto 3,666. As will be seen, the orbits of Mercury and Venus are smaller than that of the Earth and are therefore contained within the latter; these two planets are thus known as " inferior planets ". The remainder are called " superior planets " since their orbits lie outside that of the Earth.

All the major planets move round their orbits in the same direction, which, as seen from the Earth or Sun, is counter-clockwise. The periods of revolution are approximately as follows: Mercury 88 days, Venus 225 days, Earth 1 year, Mars 1·9 years, Jupiter 11·9 years, Saturn 29·5 years, Uranus 84 years, Neptune 165 years, Pluto 248 years. No one man can thus live to see a complete revolution of Neptune or Pluto.

Jupiter, Saturn, Uranus and Neptune form a group of very large planets, Jupiter, the largest, having an equatorial diameter of 88,700 miles and Uranus, the smallest, a diameter of 30,900 miles. Of the other major planets the Earth, whose equatorial diameter is 7,927 miles, is the largest and Mercury, with a diameter of 3,000 miles, the smallest. The diameter of Pluto is not yet known exactly; it is probably about the same size as Mercury.

The Zodiac

If the orbits of the other planets were in exactly the same plane as the Earth's orbit, each planet would appear to us to be always exactly on the ecliptic. This is not the case, but the orbits of the major planets, with the exception of Pluto, are very nearly in the plane of the Earth's orbit. Of the five bright planets, Mercury's orbit has the greatest inclination, 7°, and Jupiter the least, 1·3°. As viewed from the Earth, the apparent angular distance of a planet from the ecliptic at a given time depends not only on the fixed difference of the plane of the orbits, but also on the relative position of the Earth and planet in their orbits at the time. The bright planets are all seen near the ecliptic, and according to circumstances may be somewhat to the north or south of it, or occasionally exactly on it. The greatest apparent distances of the five planets from the ecliptic are as follows: Venus 9°, Mercury 5°, Mars nearly 5°, while Jupiter and Saturn never quite reach 3°. A belt of about 9° on either side of the ecliptic will thus contain all possible positions of the bright planets, and also those of Uranus and Neptune. This belt was called the Zodiac by the ancients and the name is still in use. It means " the circle of the animals ", since most of the 12 constellations into which the belt of the Zodiac is divided represent animals.

The Apparent Movements of the Inferior Planets

In Fig. 1 the orbits of the Earth and Mercury are shown to scale, and in Fig. 2 those of the Earth and Venus are shown on the same scale. As the orbits of Mercury and Venus lie within that of the Earth, neither of these planets can at any time attain more than a limited degree of angular separation from the Sun. The apparent motions of Mercury and Venus, neglecting minor variations, may be compared with the slow swing of a pendulum from a position east of the Sun to one west of the Sun and back again. When one of these planets appears to us to reach its farthest point from the Sun, it is said to be at " greatest elongation ", east or west as the case may be. When elongation is east, the planet's right ascension is greater than that of the Sun and it is observable after sunset as an " evening star "; when elongation is

west, the planet's right ascension is less than that of the Sun and it can be seen before sunrise as a " morning star."

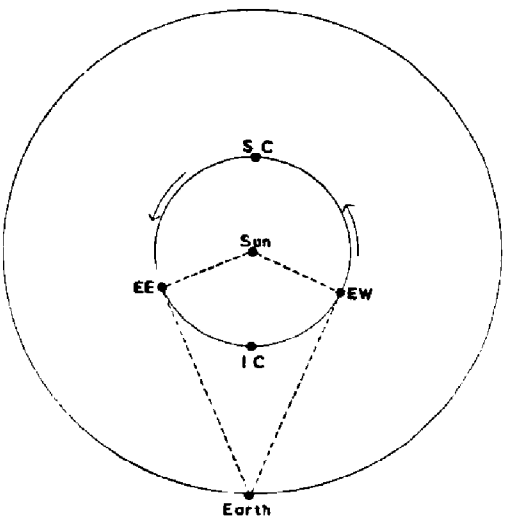


Fig. 1
Positions of Mercury
SC = superior conjunction
EE = greatest elongation east

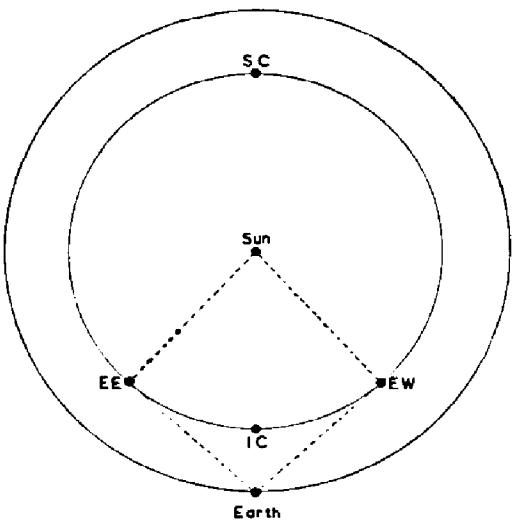


Fig. 2
Positions of Venus
IC = inferior conjunction
EW = greatest elongation west

After being at greatest elongation east (EE, Fig. 1) Mercury, moving counterclockwise in its orbit, recedes back toward the Sun and in due course arrives at the position IC, between the Earth and the Sun, when the planet has the same right ascension as the Sun. Mercury is then said to be in " inferior conjunction ". Usually, at inferior conjunction, Mercury passes a little above or below the Sun, but in some years it passes across the disc of the Sun, giving the phenomenon known as the " transit of Mercury ", when the planet appears as a small black spot when viewed with a telescope.

Continuing its orbital motion, Mercury arrives at greatest elongation west (EW, Fig. 1); it then appears to recede back towards the Sun and arrives at the point SC. Here the planet has again the same right ascension as the Sun, being in line with the Earth and Sun, on the farther side of its orbit. At this point Mercury is said to be in " superior conjunction ".

At elongation the planet appears to be stationary, since it is moving in our line of sight. At either conjunction it is moving relatively fast, since the movement is then at right angles to the line of sight. The apparent movement is greatest around the time of inferior conjunction, when the planet is at its nearest point to the Earth.

The orbit of Mercury is more eccentric than those of the other bright planets, and according to the relative position of the orbits of the Earth and Mercury at the time, the planet may be as much as 28°, or as little as 18°, from the Sun at elongation. The eccentricity of the orbit is not shown in Fig. 1.

No ephemeris of Mercury is given in the abridged Nautical Almanac, but the periods of its visibility may be obtained from the dates of elongation given, with other planetary phenomena, on page 3 of that work. Mercury is visible both before and after the date of greatest elongation. The opportunities for observation at different elongation dates are not equally favourable, depending on the angular distance of Mercury from the Sun, and on the

planet's altitude, which latter depends on the planet's declination and the observer's latitude. The planet may thus be visible for only about a week or up to a fortnight or more.

Mercury may at times be well seen in temperate latitudes, but always in twilight; in tropical latitudes, in favourable circumstances, it may be seen in a nearly dark sky, when it is a very striking object. Its brightness at elongation is never less than the first magnitude and may be as much as magnitude minus 1·2, i.e. between six and seven times brighter than the first magnitude, when it is nearly as bright as the star Sirius.

There are usually six dates of greatest elongation in the year, three east and three west. In some years there are seven. Mercury takes about six weeks to pass round the nearer part of its orbit, from the time it is visible as an evening star to when it is visible as a morning star. The interval from morning star to evening star, round the farther part of the orbit, is longer, about 10 weeks, since a larger part of the orbit has to be traversed.

It will be noted that the total period of about 16 weeks required for this movement is longer than Mercury's period of revolution once round its orbit (88 days). This is because the positions of elongation and conjunction are relative to the position of the Earth, which has also been moving continuously, in the same direction but at a slower rate than Mercury. Thus from one position of, say, inferior conjunction to the next, Mercury has not only to complete one revolution round the Sun, but also has to perform part of a second one before it can again come into line between the Sun and the Earth, the latter having moved a little more than a third of the way round its own orbit in the interval.

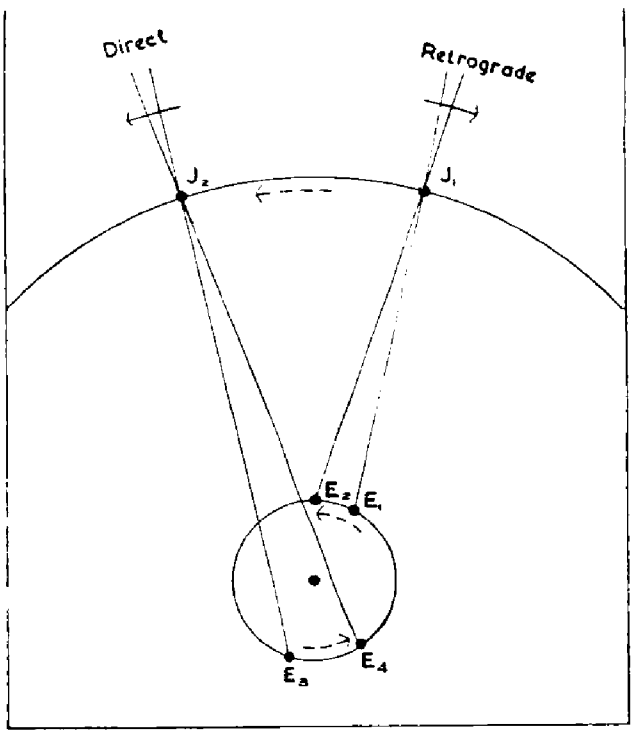
Venus passes through the same four positions relative to the Earth, see Fig. 2, the two elongations and the two conjunctions, with at rare intervals a transit of Venus across the Sun's disc at inferior conjunction. The dates of elongation and conjunction will be found on page 3 of the abridged Nautical Almanac. Owing to its larger orbit, its angular distance from the Sun at greatest elongation is about 47° and its orbital movement is much slower. The change from greatest elongation east (evening star) to greatest elongation west (morning star) takes about 20 weeks. The change from morning to evening star, when Venus moves round the farthest part of its orbit, takes about 63 weeks. The periods of visibility of Venus are thus very much longer than those of Mercury. Being the brightest object in the sky, after the Sun and Moon, Venus is always conspicuous when above the horizon, even in bright twilight. Venus, when not too near the Sun, and at not too low an altitude, can be seen with the naked eye during the daytime. It is not easy to find on a casual glance, but once found may be quite conspicuous in full sunlight.

Mercury and Venus show phases similar to those of the Moon, if viewed with a telescope. They are invisible, at the new moon phase, when nearest the Earth, i.e. in inferior conjunction, and are at the full moon phase at superior conjunction, when farthest from the Earth. At the elongations they are in the quarter phases. When a fine crescent, a little before or a little after inferior conjunction, Venus is so large that the crescent shape may be seen with glasses magnifying only three or four diameters. In most years Venus, when at its brightest, exceeds magnitude minus 3; once in every eight years it reaches its maximum brilliancy of minus 4·4. In any given year

Venus attains its greatest brightness about a month after greatest elongation east and about a month before greatest elongation west. In the former case the greatest brilliancy represents a balance between the increase of size as the planet comes nearer the Earth and the decrease in phase which accompanies its approach. In the latter case the balance is between decreasing size and increasing phase as Venus moves away from the Earth.

The Apparent Movements of the Superior Planets

As the orbits of these planets lie wholly outside that of the Earth they must in due course appear to make a complete circuit of the Zodiac, passing through each of the 12 constellations in turn. If we could view the movement from a fixed Earth, or from the Sun, it would be continually to the eastward, but varying slightly in rate, since all planets move more rapidly in that part of their elliptical orbits at which they are nearer the Sun. As seen from the Sun, each planet would make one circuit of the sky in its period of orbital revolution, Saturn in about 29½ years, Jupiter 12 years and so on. Our actual viewpoint, the Earth, is however moving all the time, in a smaller orbit, and



The pecked arrows show the actual direction of movement of the Earth and Jupiter in their orbits. The full arrows show the apparent movement of Jupiter in the two cases

Fig. 3
Direct and retrograde motion of Jupiter

therefore at a greater rate than any of the superior planets. This complicates the apparent planetary movements, and there are times when the relative movement of the Earth and the planet causes the latter to appear to move for a time in the opposite direction, i.e. to the westward. This is shown in Fig. 3, where the Earth's orbit and part of Jupiter's orbit are shown on a smaller scale than that of Figs. 1 and 2. When the Earth is on the side of its orbit nearest to Jupiter, for example in the position E_1, Jupiter is sighted along the line E_1J_1. After the Earth has moved to E_2, Jupiter is seen along the line E_2J_1. This swing of the line of sight causes the planet to appear to move toward the west. This is called a retrograde movement, since it is

opposed to the normal eastward movement of Jupiter in the sky, which goes on for most of the time. When the Earth is on the opposite side of its orbit, say at E_3, the line of sight is E_3J_2. As the Earth moves to E_4 the line of sight gradually swings to E_4J_2, giving an apparent eastward movement of Jupiter in the sky.

Fig. 3 is inaccurate in one respect, since between the Earth's successive positions E_1 and E_2 and again between E_3 and E_4, Jupiter has moved slightly to the eastward by its own orbital motion. Jupiter's change of position has been omitted, since it would complicate the diagram. Its only effect is that the retrograde apparent motion is actually less than the diagram shows while the direct apparent motion is more.

On account of the small difference in the planes of the orbits of the Earth and Jupiter, the westward apparent movement is not exactly in line with the eastward one, and if the planet's successive positions in the sky be noted it will be found to trace out a loop. In each year there is one loop, which varies from about 7° to 10° in length, followed by a much longer unbroken movement eastward, which gradually slows down before the next loop is performed. The loop is above the line of general eastward movement in

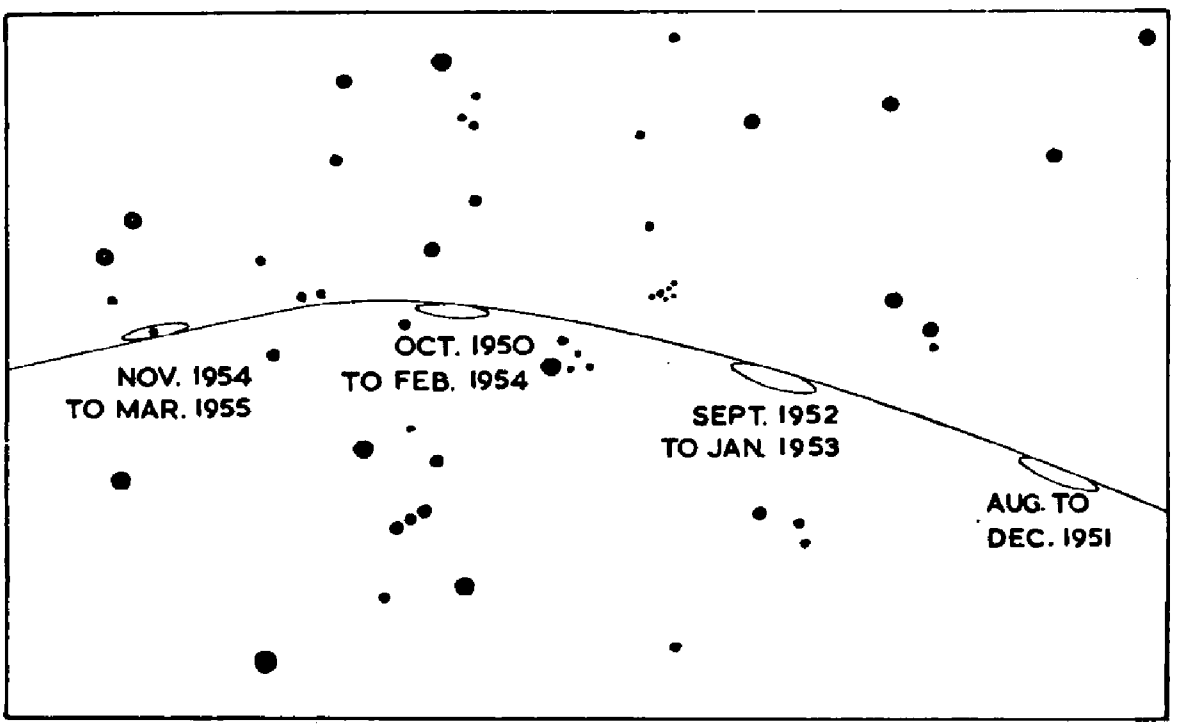


Fig. 4
Apparent paths of Jupiter, 1951-1955

some years and below it in others. Fig. 4 shows the apparent path of Jupiter in the sky for the years 1951 to 1955. Actually the loops take slightly different forms, some of which are shown in Fig. 5. It will be seen that one of these is not a closed loop but an open double bend.

The loops traced out by Saturn are of the same general character, but are flatter; their maximum length is about 7°. They are also traced above and

below the line of eastward movement, during the 29½ years of its period of revolution.

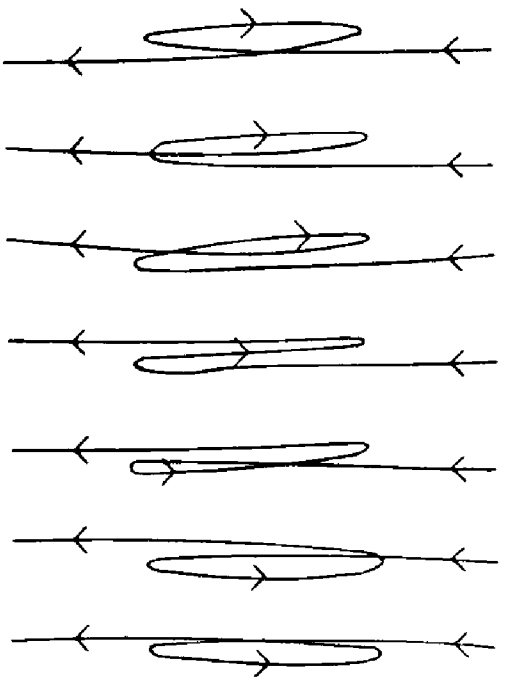


Fig. 5
Loops traversed by Jupiter about the time of opposition

When the apparent movement of Jupiter or Saturn is changing from the eastward to the westward direction, or vice versa, there is a very short time, about a day, during which there is no movement either east or west. The planet is then said to be " at a stationary point ".

The loops traced out by Mars are much larger, since the orbit of Mars is much nearer the Earth than those of Jupiter or Saturn. The loops of Mars are frequently closed ones, 20°–22° long, but there is considerable variation of form. One of a different type is shown in Fig. 6. The relative proximity of Mars also accounts for the fact that in performing one loop and the subsequent eastward movement, it makes one complete circuit of the Zodiac and part of a second one.

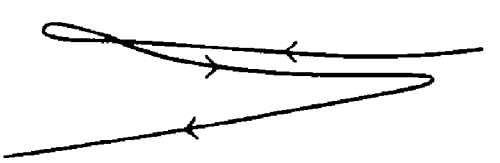


Fig. 6
A loop of Mars' path

When a superior planet has the same right ascension as the Sun, it is said to be in " conjunction " with the Sun. When the right ascensions differ by 12 hours, i.e. when the Earth is in line between the Sun and the planet, the latter is said to be in " opposition ". The dates of opposition and conjunction are given on page 3 of the abridged *Nautical Almanac*. When in opposition a planet is nearest the Earth and crosses the meridian at midnight. It is thus

in the best position for astronomical observation, and the period round about opposition is also the best for watching the apparent movements of the planet, since at the time of opposition the planet is half-way along the westward moving part of its loop. The conjunction of a superior planet with the Sun occurs in the middle of the long arc of eastward motion. The planet is then, of course, invisible in the daylight. Jupiter and Saturn are so far from the Earth that changes in their position, as viewed with the naked eye or with binoculars, will not be seen after an interval of one day. Mars, however, when nearest to the Earth, may show a change nightly.

Conjunctions and Occultations

Once in about four weeks the Moon performs the easterly circuit of the sky, continuously without any backward movement, as it is rotating round the Earth as centre. Its orbit is inclined about 5° to that of the Earth, so it moves in the same belt of the sky as the planets do, and may at times be as much as 5° north or south of the ecliptic.

In its monthly journey it can be seen to pass in turn all the planets that are visible at the time. These conjunctions, when the Moon and planet have the same right ascension, occur at varying small angular distances and provide interesting spectacles, particularly if close. They do not last long, as the Moon moves eastward over its own apparent diameter in less than one hour.

At certain times, two of the bright planets may be in conjunction with each other, at greater or lesser angular distance; there are a number of such phenomena every year. Much rarer events also occur, which no one observer may have the chance of seeing during his lifetime. The first of these is that two bright planets apparently approach each other so closely that, to the naked eye, they seem one object. The second, which is still more rare, is that three or more of the bright planets may be very approximately, or even exactly, in conjunction at the same time.

Apart from actual conjunctions, many interesting configurations occur when two or more bright planets appear relatively close to one another, perhaps with the Moon in the vicinity also. When the planets are so close that they come within the same field of view of binoculars or telescope, it is interesting to note the contrast of their colours. Perhaps once or twice in a lifetime one may have an opportunity of seeing all five bright planets in the same region of the western or eastern sky.

At rather rare intervals the Moon may pass in front of a planet. This is called an occultation and forms a very interesting spectacle, especially with binoculars or other optical aid. Before full moon the disappearance of the planet takes place at the dark side of the Moon and reappearance at the bright side. After full moon this is reversed.

The Moon must pass over many thousands of stars, the majority of which are telescopic ones, during each of its monthly circuits of the sky, but its light renders all but the brighter naked eye stars invisible, unless considerable optical aid is used. Occultations of bright stars are interesting, if viewed with binoculars or other optical aid, especially if either the disappearance or reappearance occurs at the dark limb of the moon, i.e. when the moon is not full. The disappearance, or reappearance, at the dark limb is absolutely instantaneous, as no star has any apparent size, on account of its great distance. In some years occultations of one of the bright stars Aldebaran, Antares,

Regulus or Spica may occur, and the occultation of the same bright star may then recur in one or more subsequent lunations. The occultation of such a star, if the Moon be not full, may be observed with the naked eye, but is better seen with binoculars. The interesting naked eye star cluster, the Pleiades, is sometimes partly occulted.

As the Moon is comparatively near the Earth (mean distance 239,000 miles), it is projected on a somewhat different part of the sky when viewed at the same instant by people in various parts of the world. Individual occultations are therefore only seen over a limited extent of the earth's surface and predictions of occultations are only given for a few standard places. As an example, a planet or star occulted at Greenwich may be passed at some distance by the moon as seen at Melbourne, and a conjunction occurs instead of an occultation.

Conjunctions and occultations are not given in the abridged *Nautical Almanac*, but when a planet or bright star is observed a few degrees to the eastward of the Moon it is only a matter of time before either a conjunction or an occultation must occur.

It is possible for one of the nearer bright planets to pass over (occult) a more distant one, or for any bright planet to occult a star, but such occurrences are very rare.

Visibility of Planets in Daylight

The visibility of Venus in full sunlight has already been referred to. The essential requirement for seeing a planet in the daytime, either with the naked eye or with small optical aid, is that the sky is a clear deep blue, without any trace of whitish haze or thin cirrostratus cloud to dim the blueness. In addition the planet must have sufficient altitude. The only other planet which can be seen with the naked eye at times in daylight is Jupiter, which, if it can be found, is visible in a good sky for an hour or more after sunrise or before sunset, providing that its angular separation from the Sun is considerable. It cannot be seen with the naked eye when the sun is at higher altitudes, but may then be visible in binoculars or in the sextant telescope. It is much less bright than Venus and it is not possible to find it, either with the naked eye or in glasses, except by one of the three following methods: (*a*) by determining its altitude and azimuth; (*b*) if it happens to be in close proximity to the Moon or to Venus; (*c*) by keeping a watch on the planet from the morning twilight period until after the sun has risen. Mercury, Mars and Saturn are not visible in daylight except in larger telescopes than those normally available on board ship.

RADIO COMMUNICATION APPLIED TO METEOROLOGY

BY E. J. BELL, A.I.E.E.
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Before the advent of the electric telegraph, the transmission of intelligence had to be achieved by visual or oral means or by messenger. The most primitive methods of signalling were by fires or smoke or by native drums, and in England one still sees relics of the beacons which were used to give warning of possible invasion. Later, flags and semaphore and distant signals such as the sphere and cone came into use, and with the invention of the morse code the use of signalling lamps and the heliograph became possible. At the end of the eighteenth century the first real mechanical contrivance for signalling made its appearance, in the form of the semaphore. The electric telegraph quickly showed its superiority over mechanical and visual devices ashore, and its use rapidly developed so that a network of telegraph wires soon spread over the land. This was progress indeed, but countries separated from each other by sea were still without means of international communication. The answer was provided by the submarine cable, the first of which was laid across the Straits of Dover in 1850. This was not a success as its insulation was soon destroyed. A new cable was laid in the following year using a better form of insulation and mechanical protection; this cable remained in use for many years. The first transatlantic cable was laid in 1858, but like the first cable across the Straits of Dover, it was not very successful. Commercial communication was satisfactorily established across the Atlantic in 1866 when a new cable was laid. From these skeleton cable services there grew new and supplementary services until a world-wide cable system came into existence. The growth of the cable network provided a reliable and efficient means of communication between distant countries, but there still remained the problem of telegraphic communication with ships at sea, when out of visual contact with the shore or other mobile stations. There was, in other words, a requirement for some new invention to fill this gap. The answer, as we all now know, was wireless communication.

The invention and development of wireless telegraphy is synonymous with the name of Marconi. Nevertheless, we must also remember such names as those of Maxwell, Hertz and Branly, for it was these pioneers who influenced Marconi in his early work. With the names of Maxwell and Hertz we associate the theory and proof of the laws of electro-magnetic radiation. Hertz proved that electro-magnetic waves travel with the same velocity as light, that they can be reflected and polarised, that they are propagated in straight lines, but they cannot pass through metal screens. Branly is remembered for his invention of the coherer which bears his name.

It was in 1896 that Marconi came to England to perfect his inventions and obtain a British patent. Very soon he was able to demonstrate before the Engineer-in-Chief of the British Post Office and bring his invention to the notice of the public by achieving radio communication over a distance of eight miles on Salisbury Plain. In July, 1897, he gave a demonstration to the Italian Government by installing apparatus on two warships and establishing communication up to a distance of 12 miles. Shortly after this " The Wireless Telegraph and Signal Company Ltd. " was formed, later (in 1900) becoming renamed " Marconi's Wireless Telegraph Company Ltd."

Very early Marconi found that greater ranges could be spanned over sea

than over land. As it was over the sea that the existing cable methods were inadequate and for shipping impossible, it was over the sea that wireless first came into its own. In 1899 masts were erected for experiments across the Channel, one being near Boulogne and the other near Dover. The success of this radio communication across the Channel created widespread interest; its importance to shipping was generally accepted. An obvious development from the cross-Channel experiment was to explore the possibility of trans-atlantic radio communications. A transmitting station was built at Poldhu near the Lizard, and for his trials Marconi arranged to set up his receiving apparatus in Newfoundland. The first simple signals to be received and recognised by trans-Atlantic wireless telegraphy were the morse symbols for the letter " S "; the date was the 12th December, 1901. The following February it was decided to carry out tests to see how far the Poldhu station could be heard by a ship. The S.S. *Philadelphia* was selected, using a receiving aerial fixed to the top of the mast, which was about 170 ft. high. Readable messages were received and recorded on tape at ranges exceeding 1,500 miles from Poldhu. During this voyage Marconi also discovered the rudiments of different propagation conditions by day and by night.

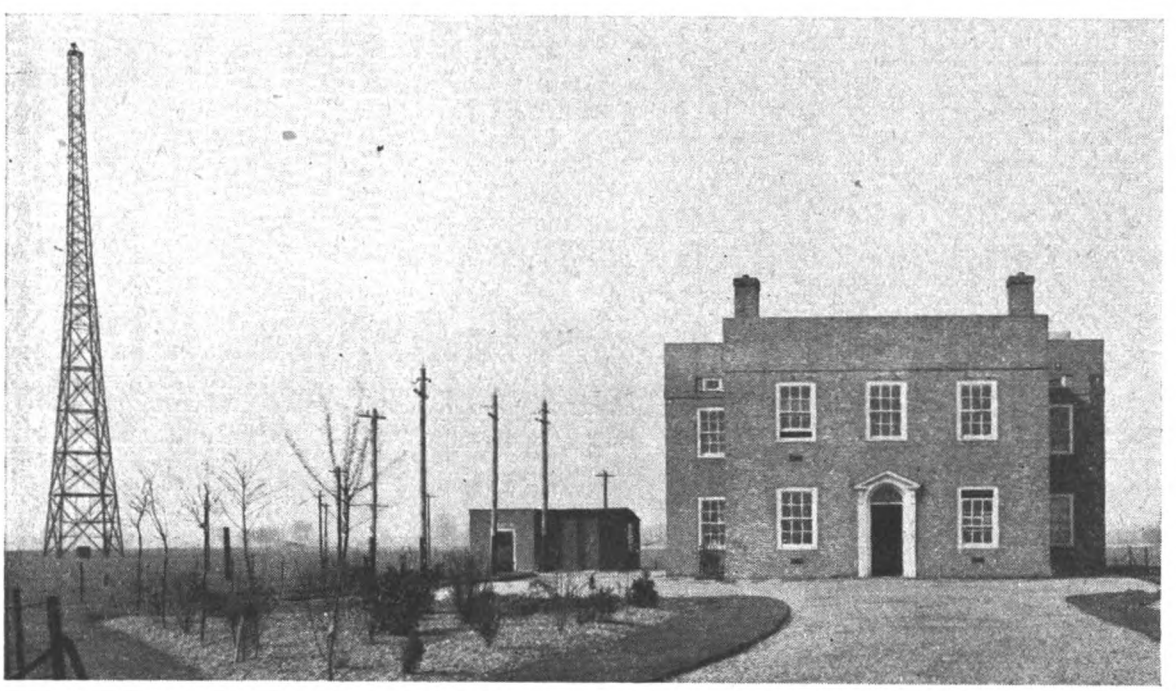

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Fig. 1
View of Burnham Radio Station

From these early discoveries and inventions the field of wireless telegraphy widened as improvements to transmitting and receiving equipment and also aerials were made. More and more powerful transmitters were constructed, more sensitive forms of detection and the directional properties of aerial systems were discovered. Photographs of a modern coastal radio station, Burnham Radio, are shown in Figs. 1 and 2. This station alone contains over 35 radio receivers. The main object of the early pioneers, the one which produced the early progress, was wireless communication across the Atlantic, and by 1908 it had reached the stage whereby an unlimited public telegraph service was available between the United Kingdom and Canada.

Early Naval Applications

As stated earlier, the first and most obvious application of wireless telegraphy was to provide communication from ship to shore and ship to ship. The British Navy was quick to appreciate this, and even during the South African War wireless proved its usefulness in enabling warships to co-operate in concerted action when well outside the range of visual communication. By the end of 1913 a highly organised naval wireless service had been established. Thus by the time the First World War broke out in 1914, wireless telegraphy was a factor which caused a major change in the strategy and tactics of war at sea. Of course, wireless not only provided a means of communicating with distant, mobile forces, but also the means of intercepting the information transmitted by enemy ships and shore stations. In addition to these uses the possibilities of ascertaining an enemy ship's position by direction finding were also fully appreciated and put to good use.

Safety of Life at Sea

Mention has been made of the early applications of wireless telegraphy for commercial purposes and for naval warfare. An equally, if not even more important use, was its application to the safety and rescue of life and property at sea. Prior to the era of wireless, a vessel in distress had no means of appealing for assistance from other vessels out of sight. A natural function of wireless telegraphy is to " broadcast " a signal, especially in the case of marine services. From this point of view, it was but a step for those who laid down the first rules for " Safety of Life at Sea ", to specify the distress procedure on 500 kc/s whereby all ships fitted with wireless were required to listen at regular intervals for the broadcast of distress calls or warning signals. It may be appropriate here to mention one of the greatest maritime disasters in which wireless telegraphy played a mixed part. The loss of the liner *Titanic* in 1912 is even today well remembered. She had been warned by wireless that ice was in her vicinity, but unfortunately this did not prevent the disaster. Her radio officer commenced to send distress calls and appealed for assistance as soon as the extent of the damage was realised. His calls were received by a number of ships, including the *Carpathia*, *Caronia* and *Olympic*, but she sank before help arrived, with the loss of over 1,500 lives. Four hours later the *Carpathia* arrived on the scene of the disaster and rescued some of the survivors. A tragic fact was that this heavy loss of life might have been avoided, for the *Californian* was actually only about eight miles away at the time. Unfortunately she carried only one radio officer and he had gone off duty and retired to bed; thus the *Californian* was deaf to the calls from the *Titanic* or any other radio station. At that time wireless was compulsory on ships above a certain size, but a continuous wireless watch was not. Had the auto-alarm been available and installed in the *Californian*, the *Titanic* story might have had a very different ending.

Radio Telephony

Mention must also be made of the introduction of wireless telephony, which has proved to be almost indispensable to the fishing fleets and to coasting vessels. All fishing vessels could not afford to carry radio officers specially for the purpose of operating W/T equipment, and it was hardly to be expected that a fisherman, bearing in mind his many other activities at

sea, could train to be an expert telegraphist. The introduction of relatively cheap and easily operated radio telephone sets for use on fishing vessels, which could be operated by the skipper himself provided he obtained a certificate as a radio telephony operator, soon demonstrated their utility, and the numbers of trawlers, whalers and other small vessels so equipped rapidly increased. From this use of radio telephony at sea there developed the present radio telephone links between the public telephone service and certain liners at sea.

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Fig. 2
Burnham Radio Station, H.F. receiving room

Early Regulations

It is of interest to note some of the chief regulations and instructions for ships and shore stations licensed by H.M. Postmaster General, as given in the Radio Telegraphists Guide and Log Book, 1912. The speed of transmission was normally to be not less than 12 w.p.m., five letters counting as one word. " Power imparted " was not normally to exceed 1 kw, but larger power could be used for signalling over distances exceeding 165 miles. As regards wavelengths, ships were normally restricted to 300 metres, but other wavelengths could be used subject to a maximum of 600 metres. Coast stations were permitted to use both 300 and 600 metres. Ships could be licensed for receiving messages from coast stations at large distances by using wavelengths exceeding 600 metres, but they were not allowed to transmit on these wavelengths. Under the heading " Obligations " the following appears:

> "All coast stations (with certain exceptions) are bound to interchange radio telegrams with ships, irrespective of the system of radiotelegraphy employed. Similarly ships with coast stations. British ships at present are not bound to exchange messages with other ships, whether British or foreign, except in cases of distress."

Meteorological Services

At the meeting of the International Meteorological Committee at Innsbruck in 1905, the Director of the British Meteorological Office " undertook to report upon the facilities afforded by the introduction of wireless telegraphic apparatus upon ocean liners, for extending the area of observations for the daily maps issued in North-West Europe, and the necessary cost of the messages ". The use of wireless for meteorological purposes was developed rapidly, and in 1911 the French service started to broadcast weather information from the Eiffel Tower transmitter. The broadcasts, compared with present-day standards, were very simple, the data consisting of reports of pressure, wind and state of sea for a few key stations on the Atlantic coasts. The selected places were Reykjavik (Iceland) (R), Valentia (V), Ushant (O), Corunna (C), Horta (Azores) (H) and St. Pierre (Newfoundland) (S). The code employed was very simple; the capital letter (shown in brackets after each station listed above) was used to identify the station, the barometer reading was given in millimetres omitting the first digit 7. Wind direction was represented in points by two digits, east = 08, etc., and wind force was given on the Beaufort Scale 0–9. Similarly the state of sea was reported on a scale 0–9. Thus each report consisted of one letter and six figures. For example, the group V592066 would be decoded as the report for Valentia, barometer 759 mm., wind SW, strong breeze, sea very rough.

Weather Information for Ships

From these early beginnings there has grown up a vast organisation for the dissemination of meteorological information and forecasts. It may be useful to summarise here the present-day facilities whereby shipping can obtain advice either by listening to routine broadcasts or by sending a request by radio to the national service concerned. For example, weather forecasts are available from the Central Forecasting Office, Meteorological Office, Dunstable, for ships within the area contained by the parallels of 65°N and 35°N and between the meridian of 15°W and the coasts of the continent of Europe. A report of the local weather conditions prevailing at certain specified meteorological or signals stations, e.g. Wick, Portpatrick, Lizard, etc., may be supplied on request; alternatively, a combined weather report and forecast can be obtained by radio telegram from Dunstable.

Weather bulletins and gale warnings are issued for shipping both over the long-distance ship-shore radio communication organisation and by the short-range British coast stations. In the case of gale warnings, Portishead Radio broadcasts these, if on hand, on the Area I transmitters (long range) from the beginning of the last half-hour of each scheduled two-hour period, i.e. 0130, 0530, 0930, 1330, 1730 and 2130 G.M.T., and it also broadcasts the Atlantic Weather Bulletin at 0930, 1130 and 2130 G.M.T. The short-range British coast stations broadcast weather bulletins for coastal areas by radio telephony at 0930 and 2030 G.M.T. on their working frequencies, after making a preliminary announcement on 1650 kc/s. Gale warnings are broadcast on 1650 kc/s at 0330, 0930, 1530 and 2030 G.M.T., but an additional broadcast is made in the first scheduled traffic period after the receipt of the warning at the coast station, should it occur before the next regular warning period. The same bulletins for coastal areas are also transmitted by W/T on the stations' working frequencies, following a preliminary announcement on

500 kc/s. The times are either 0830 and 2030 or 0848 and 2048 G.M.T., depending upon the particular coast station. Gale warnings are broadcast on 500 kc/s immediately upon receipt by the coast station, and, if received outside the periods 0800–0830, 1200–1230, 1600–1630, 2000–2030 G.M.T., also at 18 minutes past the hour during the next period. During the ice season Wick Radio broadcasts ice warnings for the Denmark Strait area, as necessary, at 0848 and 2048 G.M.T. on 435 kc/s. Further details of short-range stations may be obtained from Notice to Ship Wireless Stations No. 1 of the year 1949, and the I.T.U. List of Special Service Stations, pages 114–120 inclusive. Weather bulletins and gale warnings for coastal shipping are also broadcast by the B.B.C.

Weather Information from Ships

The value of weather reports from ships at sea cannot be over-estimated, for without adequate and accurate information from the Atlantic, for example, frequently it would be quite impossible to produce forecasts for the British Isles for more than a few hours ahead. The reports are also of considerable value to other ships within range. The first weather charts and forecast to be made at sea by a British ship appear to have been made by Mr. C. H. Williams (now Port Meteorological Officer at London) when 3rd Officer of S.S. *Kinfauns Castle* in 1921. These were based on weather reports picked up from other ships in the vicinity and on observations from five coast stations on the west and south coasts of Britain, broadcast twice daily by Poldhu. The Poldhu transmissions started on 1st June, 1921, and in that year 1,472 reports were received at the Meteorological Office by W/T from ships. By 1926, 32 ships were co-operating by sending regular reports from the North Atlantic, while the number of observations contributed had risen to 4,714. In those days " check groups " were added to coded messages as a safeguard against errors in transmission; it is recorded that 381 mistakes were detected over a period of 12 months.

Nowadays the number of voluntary reporting ships in the British service is in the neighbourhood of 600. The average number of reports received in the North Atlantic from British Selected Ships now averages about 72 per day. In addition, foreign ships send in an average of about 20 weather reports daily to Dunstable and numerous reports of surface and upper air conditions are received each day from British and foreign weather ships. Ships, when in the North Atlantic eastward of 40°W and northward of 35°N, may transmit their report through Portishead, Wick, Humber, Malin Head or Valentia on any suitable frequency, addressed to Weather Wire London. Such reports may be intercepted by any other ship and used for her own information. When observing ships are unable to pass their reports to shore stations, or are not in weather reporting areas, they are asked to, and often do, broadcast their observations on 500 kc/s. There is, however, a special arrangement whereby observing ships fitted only with medium frequency (short range) radio equipment, when out of range of the British or Irish coast stations, and during the periods 0940–1000, 1217–1245, 1730–1800 and 2140–2200 G.M.T. can pass their observations to either of the two British Ocean Weather Ship stations on 500 kc/s. The call signs of the British Ocean Weather Stations are 4YI, position 59° 00′N, 19° 00′W, and 4YJ, position 52° 30′N, 20° 00′W.

Ships which have knowledge of, or suspect the existence of, tropical

storms in their vicinity, are required by international regulations to send such information by radio with the least possible delay to other shipping in the vicinity and to the appropriate authorities, through the first shore station with which contact can be established.

The official I.T.U. name for routine weather messages to or from ships is " meteorological radiotelegram ". The definition states that such radiotelegrams consist solely of meteorological observations or forecasts which are sent by an official meteorological service or by a station in official relation with such a service, and addressed to such a service or station. Meteorological radio-telegrams must bear the " paid service indication " OBS before the address, this being the only one admitted. In calling a shore station with a weather message it is essential that the word " OBS " is included in the call in order to ensure that the appropriate priority is given to it. By international agreement land station and ship charges applicable to meteorological radio-telegrams are reduced by at least 50 per cent. Aboard British ships, thanks to the good offices of the radio companies concerned, no ship charge is levied on radio weather messages, and the land charge is paid by the meteorological service to which the message is addressed.

To speed up the handling of ships' weather messages, Portishead Radio have an arrangement by which, at busy periods, the " search-point " operators themselves accept weather messages instead of asking the transmitting ship to wait until a " working point " operator is available to handle the traffic.

Meteorological Communications Network

Upon receipt at the shore station at Portishead, ships' reports are transferred without delay to a special teleprinter circuit which provides a direct connection to the teleprinter room at Dunstable. A part of the Dunstable teleprinter room is shown in Fig. 3. Six or seven teleprinter operators are always on duty at Dunstable receiving messages on a large number of teleprinters connected via switchboards to meteorological centres all over the British Isles. As reports are received they are placed on moving belts, which convey them to a " scrutineer " in an adjoining editing room. Here the various messages are sorted and copies passed directly to the forecast room for plotting on working charts and to editing assistants, who are responsible for compiling the reports into collective bulletins for reissue on teleprinter and radio broadcasts. Thus, within about 15 or 20 minutes of its receipt at Portishead, a ship's report is being studied by the forecaster on the latest synoptic chart, not only at the Central Forecasting Office in Dunstable but also at a large number of meteorological offices at airports and service aerodromes in all parts of the country.

Teleprinters are now used whenever possible for passing meteorological data over land-lines on account of their reliability and speed of operation, which approximates to 60 words a minute when using automatic transmitters. In 1937 there were only 20 stations in the British Isles receiving data by teleprinter; during the war, in 1945, the number reached 512, and it now stands at 170. But this is not the full story, because Dunstable is connected by teleprinter lines to an international network, and is therefore able to exchange data over this network with France, Switzerland, Italy, Germany, the Netherlands, Belgium, Denmark, Norway and Sweden. Relaying

messages and bulletins is a speedy process, because reperforators are used in conjunction with teleprinters to provide a "punched" paper tape, which is used in the same way as a morse tape for passing through an automatic transmitter. The machines connected to the cross-channel circuits appear in the foreground in Fig. 3.

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Fig. 3
Part of the teleprinter room at the Meteorological Communications Centre, Dunstable

In recent years radio teleprinter circuits have been developed and the main method of exchange of meteorological data between Europe and North America is now by a radio teleprinter circuit with terminals at Paris and New York and a relay station in the Azores. It is therefore possible to exchange weather data between the New and Old Worlds at nearly three times the speed of hand-operated W/T and, as a "diplex" system is used, operational aeronautical information can be sent simultaneously with meteorological material over the same circuit.

The need for speedy reissue of weather data becomes more and more compelling as aircraft speeds increase. It is obvious that if a meteorological centre has to clear reports from say, 100 land stations in its area of responsibility, the last report to be issued, which may be a most important report for a forecaster in a distant locality, is bound to suffer a "delay" of over half an hour if issued by W/T. Even when teleprinters are used, the meteorological telecommunications service is continually being pressed to increase the speed of reissue of data. The most promising way of attacking the problem is to make use of facsimile equipment. It is quite possible to

produce apparatus which will send and receive " copy " at a speed equivalent to over 200 five-figure groups (corresponding to about 35 station reports) a minute, while additionally the apparatus can, of course, be used for transmitting weather charts. Facsimile transmissions require a relatively wide frequency band, but either good quality land lines or radio channels can be used. There are many difficulties still to be overcome before facsimile working can be accepted by the meteorologist as satisfactory. When suitable apparatus does become available, ships at sea may find it of value not only because they can thereby be provided with the latest weather chart already plotted and analysed, together with the appropriate forecasts, but also because facsimile apparatus may be used for many other purposes.

Good communications are the life-blood of synoptic meteorology. The purpose of this article has been to indicate very broadly the part played by communications in the work of the forecaster on land who requires the raw data quickly and accurately, and the mariner who requires meteorological advice in the form of an analysis with forecasts and warnings as an aid to navigation.

THE INSTITUTE OF NAVIGATION

At the meeting of the Institute of Navigation, held at the Royal Geographical Society on 16th March, 1951, Dr. G. E. R. Deacon, of the Admiralty Research Laboratory, gave a most interesting lecture on the "Application of Oceanographical Research to Navigation ".

After dealing with the relation between oceanography and navigation in general, Dr. Deacon pointed out that, though the subject of tides was in such a satisfactory state of practice and progress, continuous records cannot be made in every place for which predictions are required, and to make the best use of a short run of observations or of measurements at an adjacent station requires a reliable theory of the effect of the tide-raising forces on seas and estuaries of different size and shape. Perhaps the most outstanding practical problem is the need for continued investigation of surges and other movements of water due to meteorological causes, which although they are not tides, are a constant challenge to the authorities who have to make such accurate predictions of the normal rise and fall.

In some parts of the world the need for more detailed information of ocean currents, especially of the variations in speed and direction near the shore, is important. Thanks to the painstaking work of marine observers, especially since the middle of the last century, when the systematic collection of data was organised by the meteorological offices of the principal nations, reliable charts of monthly average currents are available for all parts of the ocean usually traversed by ships, and good use has been made of them. To do any better it will be necessary to have a thorough understanding of all the processes which produce and maintain the currents.

An intense investigation of the Gulf Stream, likely to lead to notable advances in theory and practice, is being made between Cape Hatteras and the Georges Bank east of Cape Cod, with the help of the Loran radio method

of position fixing. This investigation shows that the velocities in the fastest part of the current are greater than those normally supposed, being as much as 4–5 knots in a narrow region some 10–15 miles wide, near the landward side of the current. Transient horizontal eddies with diameters ranging from a few miles to several hundred miles, and strong countercurrents have been observed. Iselin and Fuglister (1948) mention that the research ship *Atlantis* spent 36 hours investigating a 3–4 knot countercurrent near the usual axis of the current, and during this time several freighters were sighted. It was fairly certain that these ships had been stemming the current for at least six hours, but since the charts, which are based on 24-hour observations, show few reverse sets there is a good chance that they spent the rest of the day in a more favourable part of the current. It remains to be seen whether ships using radio methods of position-fixing can gain some advantage by adjusting their course in the fastest part of the stream, or whether they will, all things considered, be as well off " taking the rough with the smooth " along the usual axis of the current.

Other instruments as well as the new methods of position-fixing are tending to focus attention on the detailed structure of ocean currents. Among them are the sea sampler, for making temperature records and taking a series of water samples down to a depth of several hundred feet without stopping the ship, and continuous temperature and salinity recorders for lesser depths. New methods of measuring water movements are being developed, and one of them, which relies on the measurement of the electromotive force induced across a stream by the movement of the water through the earth's magnetic field, has unique possibilities.

To use this method from a ship, a pair of electrodes connected by an insulated cable and voltmeter must be towed across the stream. As the ship and electrodes drift downstream an e.m.f. is induced in the connecting wire, equal to that which is induced in the water between the electrodes. If the stream were flowing over a non-conducting bed the two e.m.f's in the wire and in the water would balance and the voltmeter would record zero voltage, but since the sea bed or underlying deep water always form a conducting path there is a flow of electricity through the water, and a difference of potential for the voltmeter to measure, which is proportional to the electric current and the resistance of the water between the electrodes. The measurement cannot be interpreted without some knowledge of the depth and width of the stream and of the movements of the underlying and neighbouring water masses, but if the depth of the stream is small compared with its width, as in a wind-drift above more or less stationary deep water, the e.m.f. in the water is almost completely short circuited. The reading of the voltmeter will then be directly proportional to the rate of drift of the electrodes and connecting wire.

A knowledge of waves may come next in usefulness to that of tides and currents. During the past few years wave recording instruments have provided more detailed and accurate information than could be obtained from the previous visual observations. There is still no very practical recorder to use from a ship, and most of the measurements have been made by pressure recorders laid on the sea bottom a mile or so from open coastlines. The new records, like the new current measurements, have emphasised the complexity of the water movements—in this instance by stressing the

importance of widespread interference between waves of different lengths. Analysis of wave records from local and distant storms has shown that the wind energy is communicated to a range of component wave trains with wavelengths from ripples up to a maximum, which can be as much as 3,000 ft., depending on the greatest wind strength. Much of the observed variability in the visible crests and troughs, and the occurrence of groups of high and low waves, is due to the interaction of component waves, which although masked in the composite pattern, retain their identity, and while travelling at different speeds get in and out of step to make high and low crests. When the wind is light or the observations made near a weather shore the energy is concentrated in short waves, but with increasing strength, duration and fetch, the predominant wavelength becomes longer and longer. It has been shown that the component wave trains travel independently across the ocean with velocities proportional to their wavelengths, so that after they leave the storm area the separation between the long and short waves increases with distance. The longest waves are usually very low because their speed, practically the same as the wind, has prevented them from absorbing much energy. On a perfectly calm beach the first swell from a distant storm may be too low and too long to see, but after a while it may be noticed because of regular disturbances every 20 seconds or so round rocky ledges near water level, and then as regular long lines of low swell over the shallows. The high swell which brings most of the energy from the storm comes later still. It is important to know how the energy in the storm area is distributed over the range of wavelengths, since it determines, together with the distance of the storm, the time and rate at which the swell builds up and dies down on a distant coast.

The analysis of wave records, in addition to providing information which is being used to improve methods of predicting waves and swell from information about the winds, can be used to detect very low, long, swell usually about 12 hours before it becomes visible. The observed characteristics and the way they change can be used to predict high swell which might make a bar impassable or prevent the transhipment of cargo. The apparatus and methods in use at present are too elaborate for practical use, but they can be simplified. It may be possible to use microseismic waves travelling through the ground to obtain information about oncoming swell and distant weather. Recent Admiralty research on waves has led to a demonstration that interference between trains of waves of the same dominant length travelling in opposite directions produce fluctuations in the mean pressure on the sea bed sufficient to cause ground waves which can be recorded by seismographs 1,000 miles or more away. Interference between the waves and swell approaching and being reflected from a coast seems to be the most common cause of the microseismic oscillations, but standing seas formed when the products of two wind systems oppose each other, and pyramidal waves associated with intense cyclonic depressions are capable of producing larger oscillations. These can be separated by frequency analysis from the smaller microseisms produced near the coast. The possibility of using them to obtain information about distant sea conditions is particularly attractive since they travel from the storm area at as much as $2\frac{1}{2}$ miles a second.

Further examples, Dr. Deacon pointed out, could be given of studies of sea conditions which are more or less academic at the moment, but likely to have

useful applications in the future. The problems of interchange of energy between the oceans and the atmosphere are the most outstanding. Besides being essential to our understanding of the water movements and distribution of physical properties in the oceans, they are necessary for progress in marine meteorology, and both oceanographers and meteorologists are working on them.

P. R. B.

NATIONAL INSTITUTE OF OCEANOGRAPHY

The annual report for 1949–50 of the National Institute of Oceanography, just published (Cambridge University Press, price 5s.), gives a full account of the constitution, aims and work of the Institute.

The need for such an Institute was first suggested by the Scientific Advisory Committee of the War Cabinet in January, 1944, to meet the criticism, expressed by Vice-Admiral Sir John Edgell, then Hydrographer to the Navy, that this country had fallen seriously behind other countries in its contribution to oceanographical research.

Dr. G. E. R. Deacon, D.Sc., F.R.S., and Captain (S) R. H. C. Franklin, R.N., were appointed in 1949 as Director and Secretary, respectively, of the Institute. The Institute took over the Oceanographical Group of the Admiralty Research Laboratory at Teddington and also the *Discovery* investigations, which had ceased to be the responsibility of the Government of the Falkland Island Dependencies on 31st March, 1949. Australia, New Zealand and Ceylon have representatives on the council of the Institute and contribute to the cost of the Institute. The R.R.S. *Discovery II* and R.R.S. *William Scoresby*, which before the war were used for research work in the Antarctic, were purchased from the Government of the Falkland Island Dependencies by the Admiralty and presented to the Institute. These ships have been reconditioned, improved and re-equipped after having been handed back from war service, and this work was pressed forward so that the *William Scoresby* was ready to sail on 11th January, 1950, and the *Discovery II* in May, 1950. These ships have been engaged in continuing the work of the Discovery Committee's programme. Some details of the ships are given in an article in *The Marine Observer*, No. 149, July, 1950.

The main items in the programme of the *William Scoresby* were the marking of whales and a survey of the region of the Benguela Current off South-West Africa, where cold upwelling water stimulates the growth of a rich marine fauna. Subsidiary items included fishing experiments in South African waters, oceanographical observations in the Agulhas Current and the Indian Ocean and, if time allowed, experimental trawling in co-operation with the Australian authorities.

The ship called first at Plymouth and proceeded to the edge of the Continental Shelf south of Ireland, where a line of oceanographical stations* was worked from the shallow water down the slope into oceanic depths. The voyage then continued via Gibraltar, Freetown and Lobita. The Benguela Current survey was carried out successfully, with three lines of full stations running out from the coast into deep water. With the data from such stations

* An oceanographical " station " is a place at which a group of observations are made on one occasion. It has a serial number and a record of the circumstances in which observations are made.

[*National Institute of Oceanography*

THE CHEMICAL LABORATORY ABOARD R.R.S. *DISCOVERY II*

the whole mass of water can be mapped in the horizontal and vertical planes in respect of temperature, density and chemical and faunistic content. The Benguela Current, like the Peru Current, is occasionally subject to abnormal conditions when there is a sudden rise in temperature often associated with mass mortality of marine organisms. The present survey seems to have coincided with one of these abnormal periods, and although ordinary conditions could not therefore be mapped, the data obtained will be valuable, especially for comparison if this region can be revisited.

The programme for the *Discovery II* started with observations similar to those made by the *William Scoresby* off Ireland, but farther south where the Continental Shelf slopes down into the deep water of the Bay of Biscay. Thereafter the ship proceeded via the Suez Canal to reach Colombo early in June. The opportunity will be taken to work lines of stations, to study water movements through the Straits of Gibraltar and the exit of the Red Sea into the Gulf of Aden. The first major item in the programme will be a line of full stations through the Indian Ocean (where little is known of the oceanographical conditions) from the Equator southwards in 90°E to 30°S. The ship will then call at Fremantle and continue the same line southwards as far as the pack-ice. It is proposed to work similar lines of stations farther to the east, traversing the Southern Ocean between subtropical latitudes and the ice edge. Routine soundings and meteorological and biological observations will be made throughout the commission, and in addition, at all times while the ship is in high latitudes, special observations will be made in the distribution of whales, seals and birds, on the " krill " (the food of whales) and on icebergs and pack-ice. It is hoped that time will allow for some intensive observations on the Antarctic Convergence (a line of division between important water masses).

Other work in the field included a study, in 1949, of the local whaling industry of the Azores at 16 of the 21 stations established on several of the islands, and the carrying out of biological investigations on sperm whales. Other biological work was carried out at home.

Physical research was carried out in the British Isles on waves and swell, including long and coastal waves. The relation between sea waves and microseisms were investigated as was the exchange of energy between the sea and the atmosphere. Considerable work has been done on the development of new apparatus, including current meters, tide and wave-recorders, bathythermographs and sea samplers, wave analysers, a sea sledge and beach-profile recorder, a seismic echo-sounder and recording anemometers. Readers are referred to the report of the Institute for an interesting summary of the physical work carried out.

P. R. B.

OCEAN WEATHER SHIPS

The following extracts from reports received from the masters of Ocean Weather Ships during the early part of 1950 may be of interest to readers of this magazine:

" 15th January: By previous arrangement with *Explorer* we communicated by R.T. with the base radar staff and explained about a spare part we needed for our radar." (*Note.* This R.T. conversation was over a distance of about 550 miles.)

" 23rd January. The spare part and mails were dropped to the ship from an aircraft and successfully recovered.

" 31st January: N.C.1202, solo flight. Ship was warned by Dunstable during forenoon to listen out for N.C.1202 on 181·1 doing direct solo New York to London flight. At 1415 clipper 125 expressed concern over 1202 and asked if we had contacted. At 1422 and 1452 respectively Shannon and Prestwick asked if we had contacted yet. At 1535 ship contacted 1202 on V.H.F. 118·1. He was immediately given W.T. bearing, all winds and continuous beacon. Prestwick and Dunstable were informed. 1547 a/c 1202 given radar fix 009° 64 miles. Pilot Blair requested we pass his position to Gander, London, New York and Shannon, which we did. 1600, lost contact on V.H.F. with 1202.

" Pilot Blair during conversations expressed his many thanks for help given by Ocean Station JIG, especially radar fixes.

" During the ESE fresh to strong gale experienced during our return to Greenock, 943 mb. was recorded on the barograph, and the pen was actually resting on the instrument base plate."

[*Photograph by W. N. Burton*

Photograph taken from O.W.S. *Weather Recorder* at 59°N, 19°W at 1130 G.M.T. on 25th May, 1950. Wind force 7, height of waves 15 ft.

THE ROYAL OBSERVATORY, HONG KONG

The following are extracts from the annual report of the Royal Observatory, Hong Kong, for the year 1949–50, and demonstrates the great interest which the Director and staff of that observatory take in maritime meteorology. The Royal Observatory is the responsible authority for meteorological work in this area.

The report emphasises the great importance of ship reports in this area at all seasons—but particularly in the typhoon season. The large proportion of reports received from British ships is noteworthy. The greater the co-operation of shipping, the better the service the authorities can provide for shipping in the form of weather bulletins and typhoon warnings.

Observing Ships

The Marine Liaison Officer of the Observatory maintained close contact with merchant ships and shipping companies; 128 ships were visited in port, and 111 ships' barometers were checked. A total of 23,621 weather reports were received from ships at sea during the year; this was 2,528 more than in the previous year and represents a great deal of most valuable work carried out voluntarily by ships' officers.

TABLE I. Weather Reports from Ships

THE ROYAL OBSERVATORY, HONG KONG——TABLE I—WEATHER REPORTS

Month	H.M. SHIPS		MERCHANT SHIPS			
			British		Other Nationalities	
	No. of Reports	No. of Reporting Ships	No. of Reports	No. of Reporting Ships	No. of Reports	No. of Reporting Ships
1949						
April	90	10	949	56	632	42
May	265	14	1,221	65	651	48
June	235	11	1,108	57	633	51
July	378	15	1,241	62	716	46
August	303	21	1,160	62	638	44
September ..	465	19	1,230	70	607	57
October	282	14	1,120	57	412	41
November ..	290	15	1,001	58	517	49
December ..	309	16	1,056	50	439	45
1950						
January	329	15	1,149	58	423	42
February ..	290	14	1,041	54	355	32
March	341	19	1,285	54	460	33

Reports from ships off the China coast are of special value now that weather information from coast stations is lacking. All ships' reports received were rebroadcast for the benefit of other weather centres.

At the Observatory four marine charts, showing weather reports from all ships and a selection of coast stations, were drawn each day.

At the end of the year there were 55 merchant ships listed in the Hong Kong voluntary observing fleet—a larger fleet than that of any Commonwealth country except the United Kingdom. Twelve ships were recruited during the year, but this gain was offset by the loss of six Chinese maritime Customs cruisers and five merchant ships which left the area or were laid up.

Each voluntary observing ship was provided with a special code card for weather messages and a calendar showing the visual storm signal codes, both published by the Observatory, and received the quarterly magazine *The Marine Observer*, published by the British Meteorological Office.

Services for Shipping

Conference. The Director attended a conference on Storm Warning Procedures held in Manila in May, 1949, of which he was appointed chairman. This conference was convened under the International Meteorological Organisation and was attended by representatives of all weather services in the Far East. Its aim was to obtain closer co-ordination between the storm warning centres in this area, and to ensure greater uniformity of practice. Valuable results were achieved, though the fundamental problem of forecasting the development and movement of typhoons is still far from being solved.

Revision of Storm Warning Codes. Following the recommendations of this conference the local and non-local codes for visual storm warning signals were amended with effect from 1st January, 1950. The only major change in the local code was the introduction of the international warning signal for strong winds. The non-local code was completely revised. The opportunity was taken to publish a handbook under the title " Storm Warning Service ", explaining the storm warning facilities available in Hong Kong and incorporating the revised codes.

Non-local warnings. Storm warning bulletins, giving the latitude and longitude of tropical cyclones, with their direction and speed of movement, were issued whenever a storm centre was located within the Hong Kong area of responsibility, which is bounded by lats. 10° and 30°N, longitudes 105° and 125°E. These warnings were included in the shipping weather bulletins broadcast from Cape D'Aguilar (VPS) and in the Hong Kong Meteorological Broadcast (ZCU). They were also broadcast in English and Chinese by Radio Hong Kong (ZBW and ZEK), and were transmitted to other air terminals and to Macau. Visual signals giving the non-local warnings were displayed on Blackheads Hill.

Local warnings. Storm warnings for Hong Kong and vicinity were given by means of the Local Storm Signal Code. These warnings were distributed by telephone and teleprinter from the Observatory. A list of the storm signal stations in the Colony is given in the " Local Storm Signal Code ", published by the Observatory. Statements in non-technical language for Radio Hong Kong and the press were issued at frequent intervals whenever the Colony was definitely threatened by a typhoon.

Shipping Weather Bulletin. The " general situation " and forecasts for the following sea areas were broadcast twice daily from Cape D'Aguilar (VPS):

A. Shanghai to Foochow. B. Formosa Strait. C. Hong Kong.
D. South China Coastal Waters. E. Gulf of Tonkin. F. Luzon Strait.
G. China Sea north of lat. 10°N.

In addition a synoptic weather report was broadcast every six hours from VPS.

Special marine forecasts were available on request, and a number of ships in the Eastern and Yellow Seas took advantage of this service.

THE SEVERE HURRICANES OF AUGUST, 1949, IN THE BAHAMAS AND FLORIDA

In the July, 1950 issue of *The Marine Observer* (page 140) we published an extract of the meteorological log of the S.S. *Mataroa* relating the unusual weather conditions she experienced while approaching the Caribbean Sea during the period 19th to 24th August, 1949. The actual ship's reports are shown in Fig. 1. It is clear that conditions during the night of 23rd to 24th August were indicative of a developing hurricane although no report of a developing storm near the position of the S.S. *Mataroa* had been received by her at the time she encountered the precursory signs.

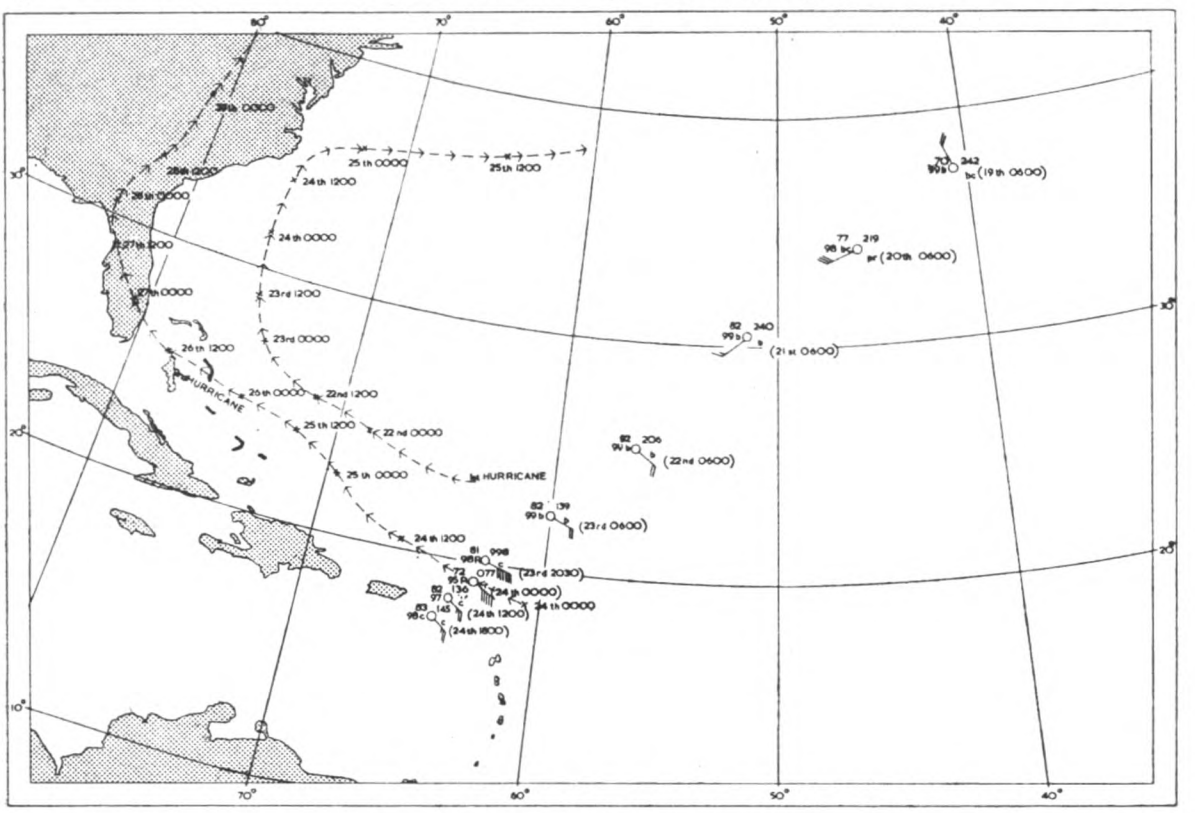

Fig. 1

Chart showing tracks of two hurricanes originating near the West Indies on 21st August and 24th August, 1949. Also observations made by S.S. *Mataroa* from 19th to 24th August

A summary of the *Mataroa's* cloud observations is as follows: " Just before 1500 G.M.T. on 19th August, 1949, a very distinct solar halo was observed through a thin nebulous veil of Cs. This was again observed on 21st at about the same time. Although well within trade wind limits the cloud formations were mainly Cs and Cc, low clouds being Cb (C_L3) and Sc (C_L4) but in a state of continual flux. These conditions persisted until 2030 G.M.T. on the 23rd when the wind increased to force 8 and torrential rain began."

The first 1949 West Indies hurricane was discovered on 21st August, 300 miles north of Puerto Rico, moving WNW at 18 m.p.h. Six hours after discovery, the hurricane centre was quite well developed, with winds of 80 m.p.h. reported by vessels in its path. This hurricane moved WNW from its point of discovery to a position 27° 30'N, 75°W, where it began to curve northward. The "eye" of the storm passed over Diamond Shoals Lightship, located off Cape Hatteras, N.C., where a 15 minute calm and minimum pressure of 980·7 mb. were recorded. Shortly after, the storm curved NE and finally E into the Atlantic. The track of the storm is plotted in Fig. 1. It was this storm to which the warning received by the S.S. *Mataroa* at 0700 G.M.T., 22nd August referred.

No sooner had this hurricane turned northward toward Cape Hatteras than a second one was discovered east of Puerto Rico. The first Weather Bureau Advisory of this storm was issued from San Juan, Puerto Rico, at 2100 G.M.T., 23rd August, locating the centre at 19°N, 62°30'W. Small craft in the northern Leeward Islands were advised to remain in port and larger vessels were urged to exercise caution. The United States Air Force and Navy sent hurricane reconnaisance aircraft to scout the storm and report its location and movement. The track of this storm is also plotted on Fig. 1. It was this storm which the S.S. *Mataroa* encountered during the night of 23rd and 24th August. The storm at this time was in its early development stage.

Signs of the existence of a developing storm were noticed by the U.S. Weather Bureau on the weather map for 1230 G.M.T., 23rd August, 1949 (Fig. 2). It was on the basis of reports received for this chart that the decision was made by the United States authorities to send a reconnaissance plane to the area in question to obtain additional observations and locate the storm's centre.

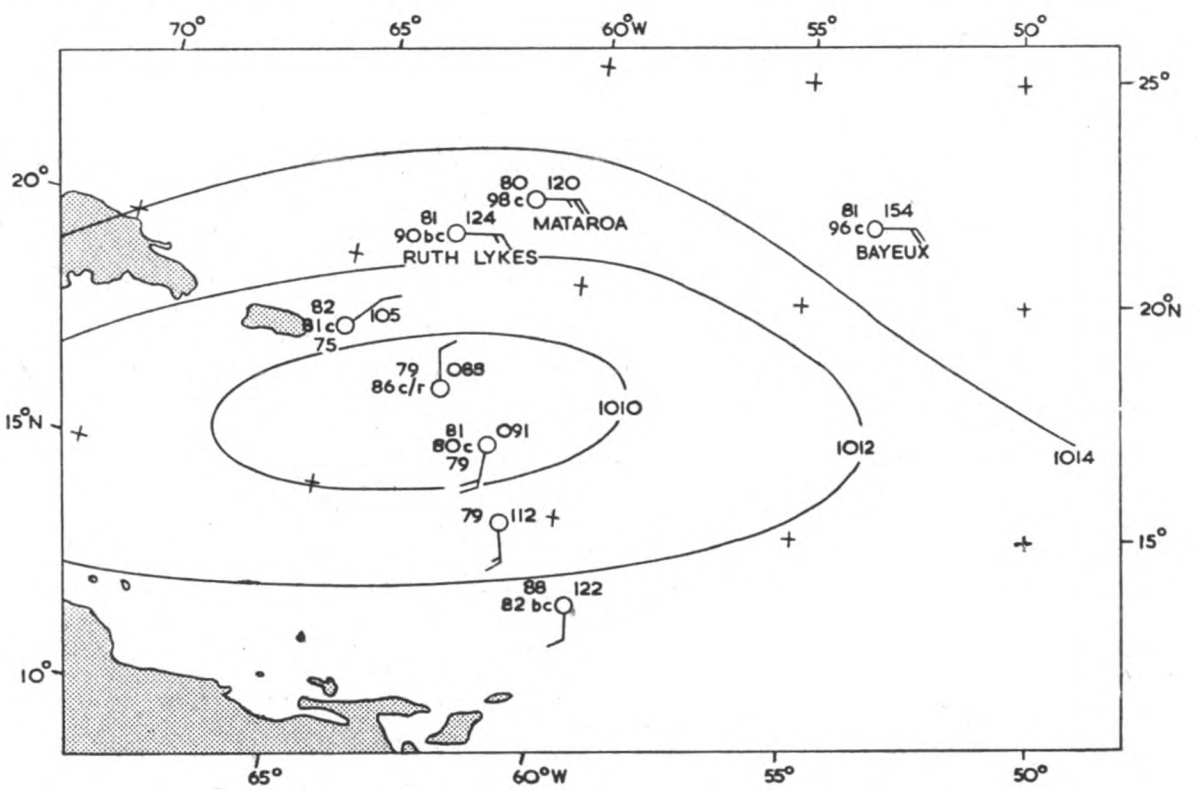

Fig. 2
Weather map for 1230 G.M.T., 23rd August, 1949

This second storm passed inland over the Florida coast at Delray Beach, about 20 miles south of West Palm Beach, where winds diminished rapidly from hurricane force to calm at 2300 G.M.T., 26th August. Winds were reported up to 125 m.p.h., with gusts to 150 m.p.h. recorded at Stuart. In many cases wind instruments were blown down and maximum winds could not be recorded. Precipitation near the centre was very heavy, with 7 in. to more than 9 in. recorded at several stations. The lowest pressure recorded was 954 mb. at West Palm Beach. A total of over 52,000,000 dollars damage was estimated to have been caused by the storm in the four south-eastern States, Florida, Georgia, North and South Carolina: 265 dwellings were destroyed and over 24,000 others damaged.

The warning service in connection with the hurricane was timely and accurate. The preliminary hurricane alert was issued 36 hours in advance, and definite hurricane warnings were issued 18–24 hours in advance of hurricane winds. Through advance warnings, safety preparation for protection of life and property were possible. As a result loss of life was extremely small. There were two deaths and 133 injuries, of which 12 were serious. Fig. 3 shows the synoptic chart for 0930 G.M.T., 27th August, 1949, at which time the hurricane was centred over Florida.

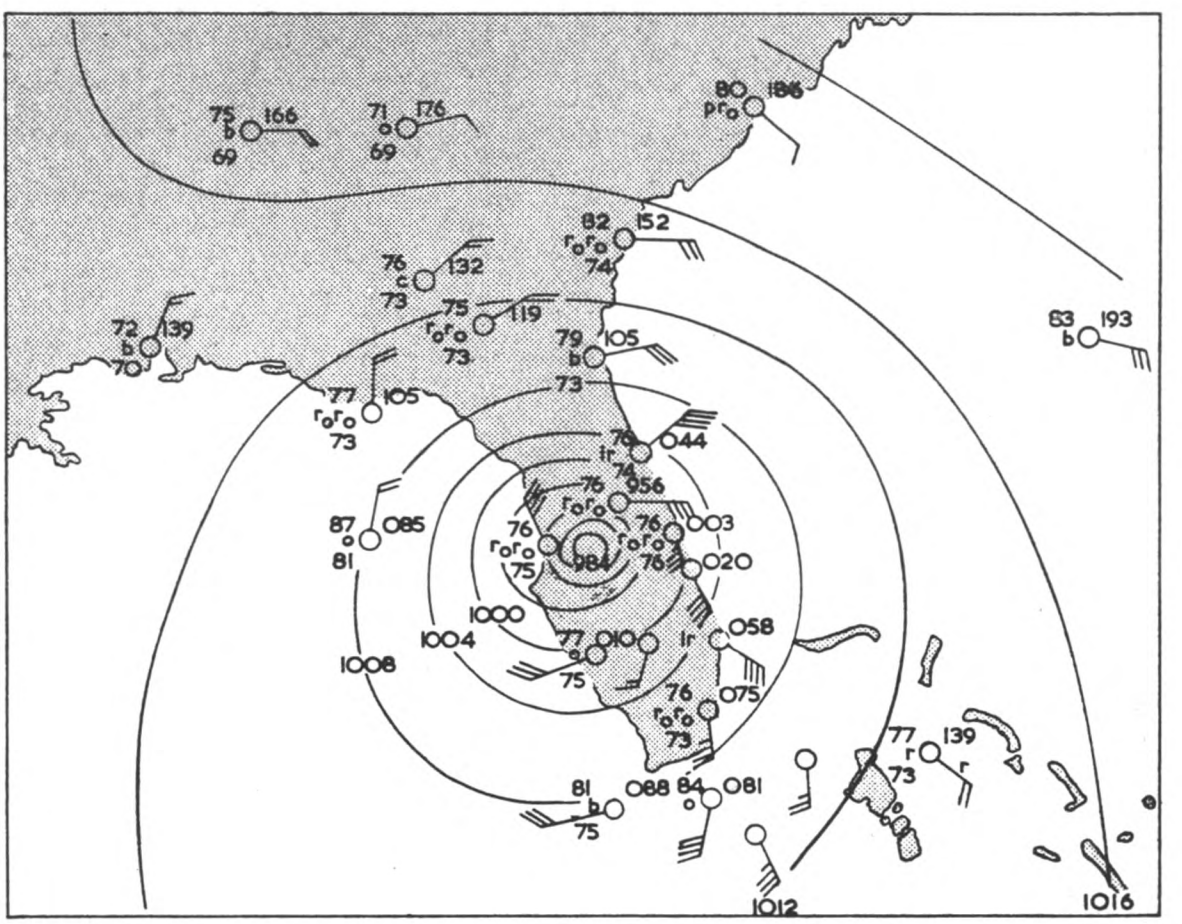

Fig. 3
Weather map for 0930 G.M.T., 27th August, 1949

The S.S. *Mataroa* was in a unique position to give timely warning of the development of the storm. The Chief of the U.S. Weather Bureau has stated that reports from the S.S. *Mataroa* were received regularly and he is grateful for this vessel's co-operation.

We are indebted to the Chief of the U.S. Weather Bureau for the detailed information, in this brief article, about the movement and behaviour of these two hurricanes.

A. H. G.

SIR ROBERT BURTON-CHADWICK

Readers of this journal will learn with regret that Sir Robert Burton-Chadwick, Baronet, the founder of the Honourable Company of Master Mariners, died on Monday 21st May, 1951.

Sir Robert had the distinction of being both a Master Mariner and a Shipowner. He was born at Birkenhead in 1869 and first went to sea in 1885 as apprentice in a sailing ship owned by his father's firm, Messrs. Gallison and Chadwick, on a voyage from Cardiff to San Francisco via Cape Horn. Ten years later, when an officer in the P. & O. S.N. Co., and having obtained his Extra Master's Certificate (Square Rig), he left the sea and entered his father's business, Messrs. Chadwick & Askew, being made a partner in 1903. He had served during the South African War in the Duke of Lancaster's Yeomanry. During the 1914-1918 war he was Director of Overseas Transport at the Ministry of Munitions, and was later a member of the Mersey Docks and Harbour Board.

In 1918 he was elected Member of Parliament for Barrow-in-Furness and was re-elected in 1922 as member for Wallasey. In the House of Commons he was always active on behalf of seamen and of the shipping industry in general. For his public services he was knighted in 1920 and made a baronet in 1935. He was Parliamentary Secretary to the Board of Trade from 1924 until 1928. It was he who inspired the formation of The Honourable Company of Master Mariners, a great idea which he was able to see come to full fruition. When the Company was formed in 1926, Sir Robert was the first Deputy Master, the Master then being the Prince of Wales; from 1937 to 1940 he was Master. During the 1939-45 war he was in Argentina as the representative of the Ministry of War Transport.

His personality and unassuming manner made him a very likeable and human person. Few men have done more for improving the status of the Master Mariner, and in his passing the Merchant Navy has lost a good friend.

C. H. W.

ERRATUM

January 1951 *Marine Observer*, page 22. The drawing of a meteor trail should refer to the report sent in from M.V. *Salamanca* printed lower down the same page, and not to the report from S.S. *El Gallo*.

FLEET LIST (Great Britain)

VOLUNTARY OBSERVING SHIPS

The following is a list of British ships voluntarily co-operating with the Marine Branch of the Meteorological Office.

The names of the Captains, Observing Officers and Senior Radio Officers are given as ascertained from the last written returns received. The date of receipt of the last return received is given in the third column.

All returns received from observing ships will be acknowledged, direct to the ship, by the Marine Superintendent.

The Port Meteorological Officers and Merchant Navy Agents at the ports will make personal calls on the Captains and Observing Officers as opportunity offers, or on notification from the ship at any time when their services are desired. (See under Notices to Marine Observers.)

Excellent awards are made at the end of each financial year. The names of the Captains, Principal Observing Officers and Senior Radio Officers gaining these awards are published in a special list in *The Marine Observer*.

It is requested that prior notification of changes of service, probable periods of lay-up, transfer of Captain, or other circumstances which may prevent the continuance of voluntary meteorological service at sea, may be made to the appropriate Port Meteorological Officer or Merchant Navy Agent.

Captains are requested to point out any errors or omissions which may occur in the list.

Selected Ships

Name of Vessel	Call Sign	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owners/Managers
Accra	GJSW	21.11.50	A. G. Baptiste, O.B.E.	D. S. Upton, N. Pryce, R. S. Elliot	J. A. Stuart	Elder Dempster Lines, Ltd.
Afghanistan	GNYB	17.4.51	W. A. Chappell	R. B. Arthur, S. W. Jones, J. Cummings	J. Nolan	F. C. Strick & Co., Ltd.
African Queen	ZBCY		A. Noble	W. H. Eardley		Colonial Development Corporation
Ajana	GKVY		F. W. Mould			Trinder, Anderson & Co.
Ajax	GJXM	27.1.51	P. A. Hanney	P. Hopper, S. Barbour, K. Barnett, H. Bowers, D. S. Moreby	A. H. Kirkby	A. Holt & Co.
Alcantara	GLQR	1.5.50	H. D. Hooper	R. B. Dales, R. Frizell, M. V. Keen	R. E. Hammond	Royal Mail Lines, Ltd.
Alcyone Fortune	MAQC	14.3.51	G. E. Milne	L. J. Paul, J. L. Paine, K. Bouic	T. Hopwood	Alcyone Shipping Finance Co., Ltd.
Amakura	MCPN	17.2.51	S. Armitage	R. G. Halliday, T. Jones, J. Donaldson	I. R. Davies	Booker Bros., McConnell & Co., Ltd.
Amastra	GYDD	4.4.51	L. E. Clayton	R. Hedley, C. Close, R. J. Bizzey	R. Lacy	Anglo-Saxon Petroleum Co., Ltd.
Amersham	GNTQ	27.2.51	A. Spence	T. Brand, E. T. Ward, J. Frain	L. Andrews	Thompson S.S. Co., Ltd.
Andes	GQCV	1.1.51	G. A. Bannister	R. D. Jones, L. Black, W. Wheatley, F. M. Dickenson, B. Sugden	W. Smith	Royal Mail Lines, Ltd.
Apapa	MACE	8.12.50	J. J. Smith	C. S. H. O'Sullivan, J. B. Olsson, R. Dixon	R. F. Barrett	Elder Dempster Lines, Ltd.
Arabia	GLKF	8.7.50	J. Chapman, R.D., R.N.R.	K. D. A. Lamb, K. T. Jones, P. Brush	B. A. Long	Cunard Steamship Co., Ltd.
Arabistan	GCKK	21.3.50	E. J. Cooke	—. Calvert, T. Dumont	W. Davies	F. C. Strick & Co., Ltd.
Araby	GMZL	29.8.50	T. W. Bolland	G. A. Wright, M. G. Boyd, K. Finlayson	T. Welch	Royal Mail Lines, Ltd.
Arakaka	GDVN	30.3.51	A. A. Gerrard	H. Adler, A. H. Harley, K. W. Leadbetter	B. Cato	Booker Bros., McConnell & Co., Ltd.
Argentina Star	GTKF	18.10.50	E. R. Pearce, O.B.E.	E. R. Hoppe, A. G. Smith, M. J. Slessor, R. Robertson	—. McBride	Blue Star Line, Ltd.
Argyll	GBWB	16.4.51	J. Dodds	A. W. Fielding, H. Bielby, L. Lumley	J. Davies	B. J. Sutherland & Co., Ltd.
Ariguani	GMBL	31.10.50	G. S. Gracie	R. D. Philpott, P. Furnival, D. Morris	A. N. Taylor	Elders & Fyffes, Ltd.
Armadale	GMCR	22.3.51	E. J. Ridout	W. L. Babbs, J. Baxter, G. C. Elvidge	E. W. Harle	Trinder, Anderson & Co.
Arundel Castle	GCZL	14.3.51	J. Trayner	R. T. Jacques, I. C. Macpherson, H. J. Norman	E. Pitt	Union Castle Mail S.S. Co., Ltd.
Ascania	GKNJ	20.3.51	B. Harrison	A. G. Broster, L. Givan, A. Diggle	H. Milligan	Cunard Steamship Co., Ltd.

Name of Vessel	Call Sign	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owners/Managers
Ashburton	GNJN	7.12.50	R. Willcocks	J. Stenhouse, H. T. O. Fuller	B. L. McCoy	Trinder, Anderson & Co.
Asia	GLJV	23.1.50	W. B. Tanner, R.D., A.D.C. R.N.R.	N. Jones, R. Manson, A. H. West, —. Nightingale	W. J. Rainey	Cunard Steamship Co., Ltd.
Assyria	GGKX		G. H. Morris	L. Portet, M. Forster, H. P. Williams		Cunard Steamship Co., Ltd.
Asturias	GLQS	30.1.51	H. G. Whittle, O.B.E.	C. Lambert, J. Hall, A. Edwards, J. Anderson	G. Hunt	Royal Mail Lines, Ltd.
Athelchief	GCRG	16.1.50	J. H. Flockhart	R. V. Parkiss, N. Jones, A. Green	W. Bradbury	Tankers, Ltd.
Athelregent	GQWL	4.1.50	J. A. Russell	R. Nicholson, R. McGregor, W. H. Buckle	A. Williams	Athel Line, Ltd.
Athenic	GBLS	7.2.51	B. Forbes-Moffatt	J. Webster, P. G. Clifford, J. Tierney	H. Knight	Shaw, Savill & Albion Co., Ltd.
Athlone Castle	GYTK	3.10.50	C. C. Page	J. Pither, F. J. Pigeon, A. S. Pellow	J. H. Summers	Union Castle Mail S.S. Co., Ltd.
Atlantis	GLTM	30.3.51	A. R. Osburn	M. Mortimer, N. Lawson, J. Kavanagh, J. P. Campbell	H. Matthews	Royal Mail Lines, Ltd.
Auricula	GKPV	6.2.51	A. Thompson	G. Blackwood, R. S. Smith, D. J. Armitage	G. G. Evans	Anglo-Saxon Petroleum Co., Ltd.
Australia Star	GYCS	19.6.50	G. M. Duff, G.M.	K. C. Crompton, T. H. Ireland, M. R. Harry	L. Cooper	Blue Star Line, Ltd.
Australind	GJKF	21.12.50	J. F. Wood	D. Ewan, J. H. C. Looker, M. Campbell	R. Brown	Trinder, Anderson & Co.
Avistone	GBSV	27.2.51	—. Niblett	F. Foster, W. Mottram	R. Charlton	Purvis Shipping Co., Ltd.
Avondene	MAWG	14.6.50	W. L. Hall	J. R. Dixon, R. L. Jones	J. Smallwood	Dene Shipping Co., Ltd.
Balantia	GBNM	21.1.51	H. Davies	W. A. Tresidder, C. C. Cowley, J. H. Evans	K. G. Arthur	Royal Mail Lines, Ltd.
Baltara	GTXM	4.1.49	G. E. Thomas	E. E. R. Roberts, R. E. G. Simmons, —. Davies, —. Morgan	C. James	United Baltic Corporation, Ltd.
Baron Elphinstone	GCCD	20.4.51	S. Williams	A. Campbell, S. Pendlington, J. Rennie	C. Clifford	H. Hogarth & Sons
Baron Maclay	GKXW	13.4.51	J. Reid	J. S. Cameron, J. W. Cameron, W. O'Neill, A. Obtulowicz	J. Hopkins	H. Hogarth & Sons
Beaverburn	MAGB	4.4.51	A. Kennedy	G. W. R. Graves, S. Fieldhouse, W. C. Halliday, T. T. Hercus, G. Morgan	T. Ainsworth	Canadian Pacific S.S., Ltd.
Beavercove	GNLX	22.2.51	D. Parsons, R.D., R.N.R.	T. E. Morris, R. Jones, F. Surtees	A. R. Porter	Canadian Pacific S.S., Ltd.
Beaverdell	GBBS	22.9.50	N. C. H. Scallon, R.D., Cmde., R.N.R.	G. Bateman, G. Palmer, R. M. Stewart	L. Norton	Canadian Pacific S.S., Ltd.
Beaverford	MQJG	8.7.50	R. A. Leicester, O.B.E.	E. R. Connerton, A. Morrell, J. Edwards, D. Wallace	W. L. Poingdestre	Canadian Pacific S.S., Ltd.
Beaverglen	GBCP	1.3.51	W. R. Thorburn	—. Walgate, R. Savage, J. P. Jones, P. Ainsworth	S. Caughey	Canadian Pacific S.S., Ltd.
Beaverlake	GBCQ	14.2.51	C. L. de H. Bell, D.S.C., R.D., Capt., R.N.R.	L. E. MacDowell, J. Waling, M. H. Scott, —. Sargent, R.N., Lt. Cdr. (Retd.)	A. E. S. Thompson	Canadian Pacific S.S., Ltd.
Beckenham	GCGK	18.1.50	D. Cameron	G. T. Sharpe, W. Gibson, M. G. King	A. W. T. Camp	Watts, Watts & Co., Ltd.
Benarty	GCZZ	14.3.51	T. Sutherland	A. King, B. Stark, D. Macfarlane, M. J. Peyton-Bruhl	R. Dixon	W. Thomson & Co.
Bendoran	MYSF	28.11.50	H. F. Masson	J. L. Forsyth, W. Watson, J. Wisden	J. E. Kemp	W. Thomson & Co.
Benmhor	GDVV	22.5.50	J. P. Robertson	J. B. Butterworth, K. Wilson, P. Shiels	P. V. Richmond	W. Thomson & Co.
Bennevis	MAGG	30.12.49	T. M. Blaikie	—. Forbes, A. Hall, M. Mathie	A. Pagan	W. Thomson & Co.
Benvannoch	GCDZ	6.1.51	A. M. Robertson	J. Clements, R. G. Faulkner, J. Ritchie	E. Carruthers	W. Thomson & Co.
Benvrackie	GBTZ	21.11.50	W. O. Atkinson	P. Angus, N. J. Mackie, J. S. Lindsay	J. L. Wells	W. Thomson & Co.
Benwyvis	MYPW	14.2.51	K. Hardie	W. W. Creber, E. H. Booth, T. Ross	D. Milne	W. Thomson & Co.
Biscoe	GDCW	14.3.51	W. Orrell	D. Mackinnon, J. W. Cook, B. Mullan	F. Jacovides	Hector Tankers, Ltd.
Boynton Wyke	GBZV		G. Glixby			West Dock Steam Fishing Co., Ltd.

Brasil Star	GTLF	15.11.50	G. C. Barnard	R. G. Taylor, B. Macphail, T. Ripley, J. B. Hall	T. Murdock	Blue Star Line, Ltd.
Bravo	GLDZ	14.11.50	W. Hill	F. Barnes, H. Jardine, R. Martin	R. Newton	Ellerman's Wilson Line, Ltd.
Brisbane Star	GZCJ	21.12.50	S. Foulkes	A. Lewin, W. Bowie, J. Harris, A. H. White	R. G. Thomson	Blue Star Line, Ltd.
Britannic	GDXF	1.1.51	R. G. Thelwell, O.B.E., R.D., Cmde., R.N.R.	G. K. Westerman, B. O'Brien, G. L. Mitchell, —. MacAlister	J. R. S. Kidson	Cunard Steamship Co., Ltd.
British Colonel	GFDB	7.3.51	W. F. Beddison	L. Ashburn, T. Skuse, J. McMillien	C. R. Currier	British Tanker Co., Ltd.
British Endeavour	GFCN	23.2.51	H. J. Were	R. G. Lamb, M. Boyd	R. G. Lamb	British Tanker Co., Ltd.
British Endurance	MLZM	29.12.47	R. T. C. Wright	J. Candlish, J. Colville, E. Powell	A. E. Adams	British Tanker Co., Ltd.
British Escort	GCRB	1.3.51	H. H. Burke	R. G. Dunn, D. McFarlane, R. W. Clarke, K. D. Curtis	C. Henry	British Tanker Co., Ltd.
British Lancer	MAGS	13.4.51	A. Fielding	W. Mills, C. Byrne, E. Glover	J. Kennedy	British Tanker Co., Ltd.
British Marquis	GWVL	31.10.50	C. W. Wall	R. L. Ramsay, J. Clarke, D. W. Banks	A. C. Martin	British Tanker Co., Ltd.
British Patience	GUFF	2.6.50	W. Jackson	R. D. Smithsons, F. Darby, D. Pengelly	J. Marten	British Tanker Co., Ltd.
British Pilot	GCQT	20.9.50	J. H. Nelson	B. N. Jarvis, J. Forrest, I. M. Ferrier	M. G. Rodger	British Tanker Co., Ltd.
British Piper	GDNN	25.4.50	J. P. M. Samson	J. Picken, B. H. Moore, G. R. Gray	L. Trestrail	British Tanker Co., Ltd.
British Power	GZGG	15.10.48	K. M. Mitchell	A. Fraser, P. F. Mason, E. C. Ford	F. G. Rimmington	British Tanker Co., Ltd.
British Resource	GFCD	20.3.51	J. C. Lea, O.B.E.	J. Hunter, R. I. S. Elder, P. D. Fitchew	V. Dalton	British Tanker Co., Ltd.
British Statesman	GJNR	21.12.50	A. H. Newby	G. Symons, J. A. Lamb, J. Archibald	A. V. Couser	British Tanker Co., Ltd.
British Swordfish	GCQV	13.4.51	G. T. Clarke	C. D. Brown, A. G. Tantram, E. J. Glover	R. M. McWhirter	British Tanker Co., Ltd.
Brittany	GMZS	14.11.50	G. M. Fletcher	C. D. Ratcliff, J. T. Bland, B. A. Wood	P. Mahoney	Royal Mail Lines, Ltd.
Brockleymoor	GDWP	26.11.49	D. J. Jones	F. K. Venus, W. Pattison, J. S. Clarke	N. W. Hodgson	Walter Runciman & Co., Ltd.
Byron	GNFL	26.7.50	J. Byrne	M. F. Fair, J. Corlett	J. Pryor	Lamport & Holt Line, Ltd.
Cairnavon	GPJN	24.7.50	J. W. Scott	C. Sutherland, C. Percy, J. Holland, J. Lobban	W. P. Greaves	Cairns, Noble & Co.
Cairnesk	GMKR	1.5.50	I. G. Foster	J. Hogg, W. Gordon, G. Makin, W. Fraser	E. Johnston	Cairns, Noble & Co.
Cairnvalona	GQKM	5.9.50	G. R. Norvell	N. E. Forth, R. R. Campbell, D. Prudham	T. W. Lawson	Cairns, Noble & Co.
Caledonia	GCKR	5.9.50	E. J. Stormont, M.B.E.	T. L. Langlands, T. Thompson, —. Kirk	S. J. D. Taylor	Anchor Line, Ltd.
Canton	GDDT	24.7.50	G. Stable	E. T. Griffiths, P. G. Pattinson, M. D. Pearey	J. C. R. Johnson	Peninsular & Oriental S.N. Co.
Capetown Castle	GKGM	20.4.51	J. McReynolds, D.S.C.	E. Holden, G. John, J. Buckland	J. Gilbart	Union Castle Mail S.S. Co., Ltd.
Cape York	GCZS	27.1.51	J. S. Binnie	R. Davison, R. Couth, S. Liddle	P. Macarthy	Lyle Shipping Co., Ltd.
Carlton	GIFE	20.4.49	K. Wardale	A. Dodd, W. A. Morriss, A. A. Abdullah	J. Park	R. Chapman & Son.
Carnarvon Castle	GJSL	17.1.51	J. F. Oakley	T. B. Schmidt, A. Backhouse, P. Muir	W. Brown	Union Castle Mail S.S. Co., Ltd.
Caronia	GYKS	21.12.50	D. W. Sorrell	I. Bryce, P. Jolliffe, R. T. Ibbotson, J. A. P. Matthews	G. M. Parsons	Cunard Steamship Co., Ltd.
Carthage	GRNX	12.8.50	E. R. Bodley, D.S.O.	D. Parsons, R. A. Gibbons, B. B. Jones	W. H. Chick	Peninsular & Oriental S.N. Co.
Caslon	MCJR	6.3.51	J. M. Cherry	P. F. Carnochan, L. C. Burton, F. J. Hamilton	C. Cornish	Runciman (London), Ltd.
Cavina	GKFV	8.7.50	T. H. Bull	J. Nicholson, T. H. Payne, N. Abbot	E. A. Loft	Elders & Fyffes, Ltd.
Caxton	GCDX	13.4.51	R. J. Lungley	P. B. Kelman, J. G. Wilson, —. Thompson	A. Austin	Runciman (London), Ltd.
Ceramic	GFLM	20.2.51	A. V. Richardson	W. L. Woods, T. de M. Ogier, D. Aberdeen, L. M. Howells	H. V. Littlecott	Shaw, Savill & Albion Co., Ltd.
Cerinthus	GCRM	8.7.50	J. F. Auld	B. P. Payling, D. W. Alford	F. O. Holt	Houlder Bros. & Co., Ltd.
Cheshire	GLXV	6.2.51	P. H. Potter	J. S. Brownlee, J. R. Longrigg, H. Traynor	J. L. Banks	Bibby Bros. & Co.
Chitral	GLKN	6.2.51	G. C. Forrest, R.D., Cmde., R.N.R.	P. Horniblow, N. D. Smith, J. A. Lefevre	L. D. Waterhouse	Peninsular & Oriental S.N. Co.
Cilicia	GDGL	6.1.51	J. L. Gibson	J. Henderson, H. Toms, S. McInnes	M. O'Donnell	Anchor Line, Ltd.
Cingalese Prince	GFRC	13.2.51	J. D. Fraser	R. Murphy, T. Sax, H. E. Jennings, K. Slapp	S. A. Rawlinson	Prince Line, Ltd.
City of Barcelona	GTKR	8.12.50	N. Groundwater	W. E. James, J. W. Edwards, R. E. Greenwood	G. M. Cubbings	Ellerman Lines, Ltd.
City of Bristol	GCPN	7.12.50	T. F. Symons	A. G. Hine, D. R. Townson, J. A. Buchanan	D. Laing	Ellerman Lines, Ltd.

Name of Vessel	Call Sign	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owners/Managers
City of Calcutta	GLYX	13.4.51	M. L. Hernan, M.B.E.	D. Wardlaw, D. L. Kinley, —. Ramage	D. Cross	Ellerman Lines, Ltd.
City of Cape Town	GBBQ	21.4.50	W. R. Pinchbeck	W. S. Fletcher, P. Redhead, F. Smith	D. S. Crombie	Ellerman Lines, Ltd.
City of Carlisle	GBJK	12.10.50	W. A. Hannah, O.B.E.	J. Ingoldsby, H. Swinney, I. B. Taylor, M. Langram	D. Vernall	Ellerman & Bucknall S.S. Co., Ltd.
City of Chester	MAHN	8.7.50	E. M. Robertson	P. Appleton, V. W. Pinnington, N. Paskin	J. Moran	Ellerman Lines, Ltd.
City of Delhi	GLBW	6.2.51	D. C. Hamilton	J. P. Mason-Price, N. A. C. Smith, R. A. Reid	M. F. Page	Ellerman Lines, Ltd.
City of Derby	GFWC	27.1.51	G. J. Law, O.B.E.	B. Wortly, R. King, G. W. White	W. Coughlan	Ellerman Lines, Ltd.
City of Durham	GBJM	1.9.50	H. G. Williams, O.B.E.	M. F. Ayers, D. S. Taylor, A. I. Crossland	H. Wilson	Ellerman Lines, Ltd.
City of Evansville	GJNF	28.11.50	A. M. Westlake	—. Heywood, K. Jones, A. R. Quigley	J. Arnold	Ellerman Lines, Ltd.
City of Johannesburg	GBKW	1.1.51	W. H. Matheson, O.B.E.	R. B. May, J. A. Irvine, J. I. Owen	A. R. Henderson	Ellerman Lines, Ltd.
City of Khartoum	GBZC	14.6.50	G. D. Robertson	C. P. Bradbury, C. T. Heywood, J. B. Lister, R. F. Moon	R. Greenhalgh	Ellerman Lines, Ltd.
City of Lille	GSLN	14.11.50	W. A. Owen	R. H. Bellhouse, W. H. Holden, J. A. Buchanan	R. Smith	Ellerman Lines, Ltd.
City of Lyons	GMCN	24.2.51	G. A. Ring	P. R. Skelton, B. Jones, L. H. King	W. Thompson	Ellerman Lines, Ltd.
City of New York	GLYQ		S. L. Hoare, O.B.E.			Ellerman Lines, Ltd.
City of Paris	GFQM	8.7.50	H. Percival, O.B.E., R.D. Cmde., R.N.R.	D. Dick, I. S. McGregor	B. J. Holyoake	Ellerman Lines, Ltd.
City of Pretoria	GBLN	28.2.51	A. G. Freeman	P. E. Pope, F. Braddick, J. R. Marking	J. Booth	Ellerman & Bucknall S.S. Co., Ltd.
City of Swansea	GBZT	17.3.50	F. J. H. T. Vizer	A. N. Fry, F. B. Cocking, A. K. Earl	W. Bateman	Ellerman Lines, Ltd.
City of Sydney	GSFM	24.8.49	H. Johnson	B. Walker, J. Blanch, E. E. Cooper	H. D. Smythe	Ellerman Lines, Ltd.
City of Tokio	GFMW	6.1.51	G. F. Sumpton	L. Boundy, M.B.E., E. G. J. Roberts, A. Oxberry	F. McTighe	Ellerman Lines, Ltd.
City of Windsor	GJYR	17.1.51	T. L. Vaughn	H. Lewis, E. Percy, S. Hughes	P. O'Maloney	Ellerman & Bucknall S.S. Co., Ltd.
Clan Brodie	GKPD	28.3.50	B. Vernon-Browne	J. Jones, S. F. Nicholson, K. A. Kerr, I. A. W. Williamson	W. M. Morrison	Cayzer, Irvine & Co., Ltd.
Clan Buchanan	GKNM	1.7.50	J. Forster	S. W. Brown, T. N. Geesin, J. M. Brackenbridge	J. H. Wright	Cayzer, Irvine & Co., Ltd.
Clan Campbell	GDZK	20.2.51	J. McCrone	J. Stormont, W. L. Muir, W. H. J. Dilks	R. F. Cole	Cayzer, Irvine & Co., Ltd.
Clan Chattan	GFBX	27.1.51	E. H. Stone	E. Cox, G. A. Berry, R. S. Schooling, P. A. MacNiven	E. Shillabeer	Cayzer, Irvine & Co., Ltd.
Clan Chisholm	GFBY	6.2.51	R. B. Linsley	C. A. Thomas, D. R. Godfrey, S. J. Bedford	W. Gay	Cayzer, Irvine & Co., Ltd.
Clan Davidson	MAWU	3.10.50	E. Stone	H. Lockyer, I. W. Bennett, J. N. Pearce	J. E. Appleton	Cayzer, Irvine & Co., Ltd.
Clan Forbes	GPGB	25.1.51	W. R. Woodriffe	D. de Vall, J. S. Cumming, J. S. Catteral	W. G. Peddie	Cayzer, Irvine & Co., Ltd.
Clan Macaulay	GZCS	12.7.49	A. G. Storkey	T. R. Halliday, J. Arnot, D. S. Clark	J. Ormerod	Cayzer, Irvine & Co., Ltd.
Clan Macdonald	GCPG	17.1.51	H. Cater	A. H. Banks, A. M. Vaughan, J. Walker	G. Martyn	Cayzer, Irvine & Co., Ltd.
Clan Macdougall	GFBQ	27.1.51	P. Macmillan	S. R. J. Woods, —. Morton, A. A. Elston	C. E. C. Crew	Cayzer, Irvine & Co., Ltd.
Clan Mackinnon	GKLX		S. S. Davidson	G. Spiller, F. Reid		Cayzer, Irvine & Co., Ltd.
Clan Maclaren	GSSC	19.1.51	A. Redford, Capt., R.N.R.	A. L. Pitts, D. Richards, K. Morton	R. W. Moore	Cayzer, Irvine & Co., Ltd.
Clan Macnair	GFNK	17.1.51	J. P. Dunphy	R. Shattock, W. Kenyon, J. Campbell	—. Dees	Cayzer, Irvine & Co., Ltd.
Clan Macneil	GFWP	18.4.50	J. West	G. Rowland, B. Edwards, A. P. Sweeny	A. Gordon	Cayzer, Irvine & Co., Ltd.
Clan Macrae	MAHP	13.4.51	E. Coulthart	M. Lewis, T. Aitchison, D. S. M. Tosh	R. D. Pringle	Cayzer, Irvine & Co., Ltd.
Clan Mactavish	GUBB	14.11.50	A. MacIntyre	G. B. Owen, S. M. Grant, G. A. Dubery, R. Cook	W. A. Ellmers	Cayzer, Irvine & Co., Ltd.
Clan Shaw	GBYW	13.2.51	R. P. Galer, C.B.E., R.D., Capt., R.N.R.	R. Tyrrell, A. B. Forster	G. H. Hudd	Cayzer, Irvine & Co., Ltd.
Clan Sutherland	GFWZ		H. J. Anchor, O.B.E., A.D.C., R.D., R.N.R.	J. Gibbon, N. F. Wray-Cook, S. Grant		Cayzer, Irvine & Co., Ltd.

Clan Urquhart	GFBK	17.4.50	T. W. Inman, O.B.E.	W. Graham, M. N. Ure, A. D. Rumble	A. F. McIntyre	Cayzer, Irvine & Co., Ltd.
Clearpool	MAHQ	16.4.51	J. Whamond	G. Ratcliffe, J. Forrest, D. Parker	E. Wrighton	Sir R. Ropner & Co., Ltd.
Clydebank	GKLM	22.5.50	J. E. Allen	B. H. Smith, A. R. Howson, E. A. D. Vargas	A. G. Roberts	Andrew Weir & Co., Ltd.
Columbia Star	GQGT	13.4.50	D. J. Stratta	F. C. T. Wood, D. E. Ortner, D. B. Wright, W. A. R. James	A. Etheridge	Blue Star Line, Ltd.
Comliebank	GKLJ	6.2.51	J. Townsley	J. Donald, W. Ellarby, J. P. Edminson	T. Riordan	Andrew Weir & Co., Ltd.
Condesa	MAHU	21.11.50	H. Heal	R. Tinmouth, S. J. Edgington, N. England	J. S. Bishop	Furness-Houlder Argentine Lines, Ltd.
Consuelo	GCGQ	28.12.50	H. Greenhill	D. J. C. Martin, R. Ball, P. Ramsay	T. Goodman	Ellerman's Wilson Line, Ltd.
Corfu	GRNW	8.3.51	E. F. Ferraby	—. Richardson, D. I. Parsons, J. R. Neale, C. C. Vickers	J. T. Macdonald	P. & O. Steam Navigation Co.
Corinthic	GZYL	14.3.51	G. M. Robertson, D.S.C.	R. Frisby, F. Packman, P. Harkness, D. M. Mortimer	J. W. Soulsby	Shaw, Savill & Albion Co., Ltd.
Corrientes	GFPT	28.12.50	W. Anderson	R. MacAuley, D. B. Langwell, J. H. Stark	W. Vaughan	Donaldson Bros. & Black, Ltd.
Craftsman	GPZT	17.4.50	W. F. O'Neill	W. E. Williams, W. C. Stoddart, F. L. Steele	P. Goulden	T. & J. Harrison
Cumberland	GPPY	13.4.51	J. S. Oxnard	—. Fulcher, G. Wotton, —. Hughes, A. Sewell	T. Laing	Federal Steam Navigation Co., Ltd.
Cuthbert	GFNW	23.6.49	J. Whayman, D.S.C., R.D., R.N.R.	T. E. Williams, D.S.C., R.D., Lt. Cdr. R.N.R., D. J. Taylor, A. Niblock	D. Swindon	Booth S.S. Co., Ltd.
Daleby	MFBV		J. Kenney	J. Nicholson, E. J. Middleton, A. Oates	—. Carney	Ropner Shipping Co., Ltd.
Dallas City	GCLS	6.2.51	C. E. Exton	E. Thomas, D. Baker, P. Bartlett	D. J. Barnes	Sir William Reardon Smith & Sons, Ltd.
Darro	MAID	30.12.49	T. Powell	T. Buckney, M.B.E., R. J. Kistler, K. Bolland	J. B. Smith	Royal Mail Lines, Ltd.
Debrett	GRPR	18.10.50	W. Gillespie	H. M. Bunker, I. Pritchard, H. T. Cunliffe	W. Miller	Lamport & Holt Line, Ltd.
Deebank	GTDB	20.2.51	B. Rivett	H. J. Allan, C. B. Loads, P. Grimanes	E. T. Williams	Andrew Weir & Co., Ltd.
Defoe	GNWF	14.11.50	W. C. Blake	K. Maguire, D. S. Leicester, J. G. Miles	J. E. Pickering	Lamport & Holt Line, Ltd.
Delane	MMNW	11.1.49	H. Pratt	B. M. Metcalfe, R. Baldwin, C. T. Skrastin	J. Care	Lamport & Holt Line, Ltd.
Delius	GZSY	6.2.51	A. W. Mitchell	G. West, R. W. Garcia	—. Powell	Lamport & Holt Line, Ltd.
Denbighshire	GQGW	28.12.50	J. Simpson	C. Goodman, D. Hayward, T. White, M. Davies	G. A. Heapy	Glen Line, Ltd.
Derryclare	GCKN	14.3.51	N. Bellwood	D. S. Kingsland, A. Monaghan	E. W. Divers	McCowen & Gross, Ltd.
Derryheen	MAIF	28.11.50	J. Robinson	J. McLean, R. Williams, G. Patterson	J. Byrne	McCowen & Gross, Ltd.
Deseado	MAIH	28.11.50	H. A. Wright	J. Green, J. Cresswell, P. C. T. Davies, M. Roberts	I. S. Humphrey	Royal Mail Lines, Ltd.
Devis	GFKT	9.7.48	T. J. Sweeny	T. E. Cribben, A. L. Baines, A. H. Baldwin	J. Care	Lamport & Holt Line, Ltd.
Devon	GDRF	21.12.50	A. Hocken	G. Naylor, J. Weston, J. D. Hellings	J. Tomlinson	Federal Steam Navigation Co., Ltd.
Devonshire	GTTV	17.1.51	A. Beharrel	J. W. MacKinlay, G. D. Atkinson, J. J. Mullins	G. Talbot	Bibby Bros. & Co.
Dilwara	GYQV	15.2.51	F. L. Sampson, D.S.C.	H. B. Cray, E. C. Plowman, R. B. Coates	S. J. Taylor	British India Steam Nav. Co., Ltd.
Discovery II	GWVM		J. F. Blackburn, D.S.O., Cdr., R.N. (Ret.)			National Institute of Oceanography
Dominion Monarch	GRGG	1.1.51	Sir Henry Gordon, K.B., D.S.C.	G. Conolly, J. Theakeston, J. Hurst, S. H. Wilde, J. R. Sims, A. Baber	J. A. McAskill	Shaw, Savill & Albion Co., Ltd.
Dorelian	GJTL	14.3.51	D. MacQueen	A. J. Dougall, R. S. Hopkins, A. Arnott	T. W. Moody	Donaldson Bros. & Black, Ltd.
Doris Clunies	MSLB	1.7.50	A. MacVicar	J. B. Whyte, K. M. Hamilton, —. Eelloo	H. A. Reynolds	Clunies Shipping Co.
Dorset	GZFQ	30.3.51	A. E. Williams	P. R. Fletcher, P. A. Davison, J. Burn	J. Chatier	Federal Steam Navigation Co., Ltd.
Drina	MAIL	15.11.50	D. R. Miller	J. Fox, J. Street, N. Oliver, A. Nottage	A. Humphries	Royal Mail Lines, Ltd.
Dromore	GDSF	20.9.49	J. R. Moreby	J. McCool, S. N. Coe, R. W. Keene	R. H. Heard	Furness Withy & Co., Ltd.

Name of Vessel	Call Sign	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owners/Managers
Dryden	MQFT	30.1.51	D. C. Roberts	K. Quirk, D. S. Leicester, I. Pritchard	P. Thompson	Lamport & Holt Line, Ltd.
Duke of Athens	GMYS	10.1.51	J. G. Lomas, A.I.N.A.	T. Walton, L. Labistour, N. Beattie, D. M. Stewart	T. P. Hobson	Trent Maritime Co., Ltd.
Dunedin Star	GKKT		J. C. W. Davies	R. R. Elliott, A. N. Duell, G. J. Stanley		Blue Star Line, Ltd.
Dunera	GBBR	20.3.50	A. A. Kay	F. Hills, C. R. S. Monk, L. D. Conway	A. McCartney	British India Steam Nav. Co., Ltd.
Dunkery Beacon	GUFS	14.11.49	L. E. Thomas	J. D. B. Wylie, A. J. Hawkes, D. W. Hobday	A. B. Ewart	Phs. Van Ommeren (London), Ltd.
Dunster Grange	GCSD	5.4.51	R. S. Grigg, O.B.E.	P. J. Walper, —. Wills, D. M. Smith, —. Owen	W. Bearman	Houlder Bros. & Co., Ltd.
Durango	MAIM	16.3.51	P. M. Burrell	J. Postill, R. Sly, L. L. Hunter	H. Davies	Royal Mail Lines, Ltd.
Durban Castle	GPGP	21.11.50	B. W. B. Lloyd	C. Lorrains, —. Cutcliffe, —. Becket, D. Clubb	H. A. Liggins	Union Castle Mail S.S. Co., Ltd.
Durenda	GFSL	21.11.50	A. H. Usher	H. R. Smith, D. A. C. Windle	T. Welsh	British India Steam Nav. Co., Ltd.
Durham	GWWK	8.5.50	R. J. Dunning	B. Applegate, J. T. Pettie, J. Sims, D. Hilliard	C. Robinson	Federal Steam Navigation Co., Ltd.
Edinburgh Castle	GOHN	20.4.51	—. Patey	D. Evans, G. J. G. Francis, T. P. Paine	J. Hodgson	Union Castle Mail S.S. Co., Ltd.
Edward East	GYXZ		J. A. Whittleton			H. Croft Baker & Sons, Ltd.
Egidia	GJZD	21.12.50	R. S. Paton	W. B. Sawers, W. Hallum, R. Watt, R. M. Sinclair	R. Hartley	Anchor Line, Ltd.
El Gallo	MAIP	16.4.51	S. J. Watts	J. S. Andrews, W. P. Hanrahan	E. G. Rees	C. T. Bowring & Co., Ltd.
Elysia	GJZK	12.1.51	D. Barclay	J. McLarty, J.T. Donald, A. McKendrick, N. M. Fletcher	W. H. Hier	Anchor Line, Ltd.
Empire Fowey	GMFW	30.3.51	D. G. Baillie	P. C. Reed, D. W. Lightbody, J. Howe, J. Houghton	P. Maloney	P. & O. Steam Navigation Co.
Empire Halladale	GPVQ	7.3.51	R. Blake	D. Lockhart, W. Marshall, W. M. Niven	J. N. Cragg	Anchor Line, Ltd.
Empire Orwell	GRCB	21.2.51	A. C. G. Hawker, C.B.E., R.D., R.N.R.	E. Kidd, P. C. J. Cockburn, P. Byers	A. C. Shipman	Orient Steam Navigation Co., Ltd.
Empire Patrai	GDKL	5.8.49	C. L. Thomas	M. Uminsky	G. R. Stuart	Fenton S.S. Co., Ltd.
Empire Pride	MAJB	24.7.50	W. Peate, D.S.C.	J. Priest, R. Hammond, J. Beckett	A. Mallett	Bibby Bros. & Co.
Empire Star	GCDP	28.10.49	G. E. Barnard	T. Hender, M. R. Bremberg, J. Edwards, P. Ellett	H. Smith	Blue Star Line, Ltd.
Empire Viceroy	MAJN	6.4.51	J. B. S. Bland	A. M. Brockwell, C. D. Mason, J. W. Abbott	W. Clarke	Pandelis Shipping Co., Ltd.
Empress of Australia	GFSB	21.12.50	C. E. Duggan, R.D., R.N.R.	R. A. Jones, D. Cluloy, P. A. T. Hargreaves, M. H. Scott	T. C. Mann	Canadian Pacific S.S., Ltd.
Empress of Canada	GSVR	23.2.51	J. P. Dobson, D.S.C., R.D., R.N.R.	G. A. N. Bezant, G. E. Mansell, J. Cuthbertson	J. M. Butterworth	Canadian Pacific S.S., Ltd.
Empress of France	GNTV	7.12.49	B. B. Grant, R.D., R.N.R.	J. Jeavons, J. Griffen, F. Granger	D. Murphy	Canadian Pacific S.S., Ltd.
Empress of Scotland	GMLV		E. A. Shergold	J. Richardson, J. Martin		Canadian Pacific S.S., Ltd.
Erodona	GZLQ	24.2.51	J. E. Gill	W. A. G. Curphey, J. Albert, J. Owles, J. G. Evans	J. Martin	Anglo-Saxon Petroleum Co., Ltd.
Eros	GYSB	23.4.51	R. C. Vigurs	C. P. Turquard, J. A. Mills, S. Lunn	P. McEwan	Elders & Fyffes, Ltd.
Esperance Bay	GSMP	7.12.50	T. V. Roberts, R.D., Capt., R.N.R.	G. S. Sheldon, R. G. Mossop, J. D. Rendel, J. K. Wyles	M. J. Sheehan	Shaw, Savill & Albion Co., Ltd.
Essex Trader	GCMS	12.1.51	D. G. Evans	D. A. Owen, E. H. Miles, D. Harris	R. Jones	Trader Navigation Co., Ltd.
Esso Edinburgh	GCQM	22.3.51	M. Rutherford	J. Leech, J. C. Young, P. J. Quine	W. Whittaker	Esso Transportation Co., Ltd.
Esso Glasgow	GTXC	20.10.50	D. J. Davies	E. Shields, W. G. Gamlin, E. Shelton-Jones	P. J. Everett	Esso Transportation Co., Ltd.

Esso Plymouth	GYRX	4.4.51	O. H. Shepheard	A. Hughes, R. J. Sagar, H. Johnson	D. Diver	Esso Transportation Co., Ltd..
Eucadia	GJZL		D. Morrison, O.B.E.	R. Crawford, D. McLeod, R. L. Richards, C. Boyle	D. Sproat	Anchor Line, Ltd.
Explorer	GYJX	29.3.50	J. L. Curle	W. C. Johnstone, A. T. Baxendale, W. C. T. Pennant	B. Tallon	T. & J. Harrison
Fanad Head	GNQQ	14.11.50	W. A. Haddock, O.B.E.	E. C. Rae, C. R. Wilson, A. Davies	D. Lindsay	G. Heyn & Sons, Ltd.
Flamenco	GCBV		P. L. Hockey	A. B. Powell, R. J. B. Lewis, R. Spalton		Pacific Steam Navigation Co.
Fordsdale	GSMW	6.1.51	T. H. Davies	H. G. B. Moss, J. L. Harrison, G. Main, A. Sparks	W. S. Money	Shaw, Savill & Albion Co., Ltd.
Franconia	GBRQ	1.7.50	C. B. Osbourne, R.D., R.N.R.	J. S. Rowe, P. J. Mullan, E. D. Hall	J. L. Blanchard	Cunard Steamship Co., Ltd.
Fresno City	GBYD	28.12.50	W. V. Doughty	T. W. D. John, G. Groves, J. Robiliard	D. C. Edmunds	Sir William Reardon Smith & Sons, Ltd.
Fylingdale	GKSR	7.12.50	R. Coultas	W. W. Gatenby, W. T. Feather, N. Jameson	J. W. Ellis	Headlam & Son.
Geologist	GJMR	19.6.50	A. E. Jackson	S. Richardson, D. Hancock, J. Clarke	M. H. Whitehead	T. & J. Harrison
Georgic	GRLJ	20.2.51	W. M. Stuart, O.B.E.	H. Carmichael, F. Watts, A. Leyland	N. Ryan	Cunard Steamship Co., Ltd.
Glaucus	GDYZ	28.11.50	C. F. Lock	E. M. Groves, J. R. Jones, P. H. Benson, D. Robinson	F. Devlin	A. Holt & Co.
Glenartney	GBLG	19.1.51	C. J. Tyler	J. Webster, R. G. Spence, H. M. MacFarlane	M. J. E. Wilson	Glen Line, Ltd.
Glenbank	GKLC	7.12.48	T. Fraser	W. Murphy, D. V. Hoskins	W. Lingbottom	Andrew Weir & Co., Ltd.
Glenorchy	GBLL	22.8.50	P. Cross	—. Hansell, D. Vossor	L. A. Tebbutt	Glen Line, Ltd.
Gloucester	MANK	8.5.50	N. L. Warren	F. C. Taylor, G. W. Wotton, J. Marshall	T. Herbert	Federal Steam Navigation Co., Ltd.
Golfito	GBYL	21.11.50	S. A. Sapsworth	R. A. Laycock, R. L. Leech, P. N. Mace	R. W. Smith	Elders & Fyffes, Ltd.
Gothic	MAUQ		W. J. Williams			Shaw, Savill & Albion Co., Ltd.
Gracia	MANN	14.9.50	J. McInnes	I. M. Macfarlane, —. Tomson, J. Stewart	G. Crighton	Donaldson Bros. & Black, Ltd.
Granford	MQGC		E. C. J. Morgan	W. Stoodly, A. R. Simpson, T. J. Dresh		Goulandris Bros., Ltd.
Haparangi	GJYX	14.3.51	R. G. Rees	J. R. Ramsay, C. E. Burrill, —. Slocum, —. Salwood	L. Raynor	New Zealand Shipping Co., Ltd.
Harmatris	GTWP	4.8.50	A. R. Phelps	R. A. Brock, A. H. Barber, J. R. Woodfield	A. Astley	J. & C. Harrison, Ltd.
Helicina	GKBC	17.1.51	J. B. Richie	J. Morrison, B. L. Oliver, J. B. Walker	—. Flood	Anglo Saxon Petroleum Co., Ltd.
Herdsman	GPZX	1.11.50	W. A. Short, O.B.E.	J. W. Embleton, K. Cobb, J. Cubbin, C. Arden	G. Whitiker	T. & J. Harrison
Herefordshire	GOFG	18.8.50	G.W. Dobson, R.D.,R.N.R.	B. Pennington, J. Hughes, K. Allen	F. W. Greaves	Bibby Bros. & Co.
Highland Brigade	GJKN	6.2.50	A. N. Anderson	D. W. Buckle, D. N. G. East, L. H. Paine	W. Gay	Royal Mail Lines, Ltd.
Highland Chieftain	GCTY	22.5.50	W. H. Grimshaw, O.B.E.	M. Wardle, R. M. Box, R. D. H. Manley, J. M. C. McLoughlin, C. J. S. Morris	W. Rolonson	Royal Mail Lines, Ltd.
Highland Monarch	GMZF	16.9.50	S. J. G. Hill	E. Card, J. Hall, J. Rutter, K. Jones, C. Sadler	F. Dunk	Royal Mail Lines, Ltd.
Highland Princess	GFMN	22.2.51	W. H. Roberts	C. J. Gulliford	F. G. Goodall	Royal Mail Lines, Ltd.
Hilary	GQVM	18.8.50	J. W. Binns, O.B.E.	J. H. Stoker, T. W. McMullan, L. W. Crump	T. Tyman	Booth S.S. Co., Ltd.
Himalaya	MCDY	28.11.50	H. C. C. Forsyth, R.D., Cmde., R.N.R.	G. C. Barrett, G. B. Thom, J. Crichton	F. E. Ash	P. & O. Steam Navigation Co.
Hinakura	GDVS		R. L. Warren	J. Stevens, A. F. Jenkins, J. Camping, T. Rolands	J. Braithwaite	New Zealand Shipping Co., Ltd.
Hororata	MANZ	28.12.50	E. H. Hopkins	F. Taylor, W. Peto, E. Cooper, D. Newman	D. E. Hodding	New Zealand Shipping Co., Ltd.
Huntingdon	GFCT	25.1.51	—. Fulcher	—. Dickens, J. J. M. Stratton, K. J. Field, D. Jones	A. Wallace	Federal Steam Navigation Co., Ltd.
Hurunui	GJZF	17.1.51	H. E. Reilly, R.D., R.N.R.	F. Taylor, T. Rowland, J. Milner	C. Braithwaite	New Zealand Shipping Co., Ltd.
Inishowen Head	MAOC	20.2.50	R. A. Ferguson	J. Smyth, E. McIntosh, A. MacPhail	J. J. Dunne	G. Heyn & Sons, Ltd.
Interpreter	GPZY		H. Coates	I. Mitchell, W. Eustace, R. J. Turnbull		T. & J. Harrison

Name of Vessel	Call Sign	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owners/Managers
Inverbank	GKML	14.3.51	L. W. Thorne	R. S. Mortimer, R. D. Williams, G. T. Braun	P. C. Kelly	Andrew Weir & Co., Ltd.
Jamaica Producer	VPLM	15.11.50	G. E. M. Jenkins	B. Noble, J. A. Whitehouse, C. P. Graty, A. L. Gwynne-Harrison	P. Graham	Kaye, Son & Co., Ltd.
Jersey City	GIGA	2.8.50	D. W. Boutcher	G. Harvey, J. Groves, R. Goatley	R. Jelley	Sir Wm. Reardon Smith & Sons, Ltd.
Jessmore	MAOF	6.2.51	C. G. Killick	J. Simms, D. R. G. Taylor, R. W. Liley, P. Warne	R. Deakin	Furness, Withy & Co., Ltd.
John Biscoe	VPNE	27.7.50	W. Johnston			Government of the Falkland Islands
John Holt	GNFD	31.10.50	J. Shaw	W. R. Atkinson, A. Farrel, G. Jones	—. Guthrie	John Holt Line, Ltd.
Kaikoura	GZPZ		N. Fraser	G. S. Gunn		Trinder, Anderson & Co.
Kaipaki	GQGJ	24.4.50	T. M. Fenwick	J. Farnell, J. B. Ricketts, F. Le Messurier	A. Leeder	Trinder, Anderson & Co.
Kaipara	GZPY	6.1.51	J. T. Windus	J. B. McGowan, N. Stirzaker, E. Miller	R. M. Evans	Trinder, Anderson & Co.
Kaituna	GQGG	7.12.50	R. F. Hellings	T. G. Wilson, J. Jackson, G. B. Charleson	A. Clegg	Trinder, Anderson & Co.
Kenilworth Castle	MQLP	1.1.51	L. H. Farrow	R. Dugdale, J. C. Edwards, P. A. Sharp	G. G. Kneath	Union-Castle Mail S.S. Co., Ltd.
Kent	GPDC	18.7.50	J. Moncrieff	S. Lambrick, J. Collins, D. Moran, J. North	R. Heath	Federal Steam Navigation Co., Ltd.
Kenuta	GCBW		J. D. Richards	J. Butterworth, F. Leicester, E. J. Pepper		Pacific Steam Navigation Co.
King Robert	MAON	21.3.51	G. Craze	G. Dando, P. W. Kidd, A. D. Terras	C. Cowen	King Line, Ltd.
King William	GNVF	20.2.51	A. B. Drever	J. C. Davies, T. Fairclough, D. Evans	A. McInnes	King Line, Ltd.
Kingston Onyx	MLFP		A. R. Cornish			Kingston Steam Trawling Co., Ltd.
Kohistan	GSFZ	17.1.51	A. N. Henderson	G. H. Byrne, C. O. Jones, A. Woodward	D. Chapman	F. C. Strick & Co., Ltd.
Laguna	GJKC	20.2.51	R. D. S. Eckford	R. H. Scaiff, C. Pringle	J. F. Cullen	Pacific Steam Navigation Co.
Lambrook	MAOS	4.4.50	H. F. McInnes	J. Orr, R. G. C. Gibson	J. J. Brennan	Galbraith, Pembroke & Co., Ltd.
Lanarkshire	GCTC	18.8.50	A. R. Cossar	G. Spiller, G. H. Marshall, A. D. Rumble, G. V. Davies	G. J. Ingram	Turnbull, Martin & Co., Ltd.
Lancashire	GLZC	15.5.50	E. W. Jeffries	—. Lowe, H. Treasurer, —. Thomas	A. Jones	Bibby Bros. & Co.
Lassell	GFND	1.6.49	J. King	S. Dickenson, K. Horne, P. V. des Landes	N. Moore	Lamport & Holt Line, Ltd.
Latia	GLCF	12.10.49	A. E. Bleasdale	C. S. Owston, E. R. Jenkins, —. Dyson-Cope	J. Brownlee	Anglo-Saxon Petroleum Co., Ltd.
Levernbank	GLPZ	8.7.50	D. Gillies	G. Cheyne, R. Lidstone, D. Moore	A. P. J. Brooke	Andrew Weir & Co., Ltd.
Linguist	GQBC	4.8.50	W. Weatherall	C. S. S. Boam, K. E. Pritchard, J. H. Tranfield	R. Moss	T. & J. Harrison
Livorno	GPWF	14.11.50	E. S. Greene	F. Methan, A. Bayley, G. Forward	P. Morris	Ellerman's Wilson Line, Ltd.
Lloydcrest	MAOY	12.10.50	H. R. Knight	H. W. Campbell, R. Thompson	W. Fitzpatrick	Crest Shipping Co., Ltd.
Lobos	GDXL	28.11.50	P. Ray	G. Turner, J. Galston, K. Eastwood	E. Rogers	Pacific Steam Navigation Co.
Loch Avon	GMZT	31.10.50	C. E. Mason	R. Phillips, R. G. Stapleton, N. L. Tapp	M. R. Littlejohn	Royal Mail Lines, Ltd.
Loch Garth	GMZY	30.3.51	J. Smith, R.D., Cdr., R.N.R.	M. J. Dean, J. Phillips	D. J. W. Morgan	Royal Mail Lines, Ltd.
Loch Ryan	MAOZ	3.3.51	R. N. Fletcher	T. A. Evans, A. N. Brook, A. W. Dewers, D. Hargreaves	J. F. G. Thomas	Royal Mail Lines, Ltd.
London Craftsman	GMKJ	31.10.50	S. Sloan	R. E. Huggins, D. C. Goodwin, J. Short, K. Foreman	R. Longton	Counties Ship Management Co., Ltd.
Lord Gladstone	MAPA	4.3.49	P. S. Kenning	M. Warrick	J. Saidler	Ships Finance & Management Co., Ltd.
Loriga	GCLM	4.3.50	S. E. Ayland	A. S. Maclean, R. Dootson, W. R. Goldie	J. Murray	Pacific Steam Navigation Co.
Losada	GDXM	29.7.49	D. W. Hutchinson	W. P. Duguid, P. Whelbourne, A. H. Smith	E. O'Neill	Pacific Steam Navigation Co.
Macharda	GKKF	19.6.50	R. A. Penston	—. Jackson, —. Crestwood	J. Caddy	T. & J. Brocklebank, Ltd.
Magdapur	GBJX	6.2.50	A. Hill, O.B.E.	J. Watson Ross, P. A. Gunson, A. Wood, —. Pearson	F. Bailey	T. & J. Brocklebank, Ltd.

Mahanada	GOFM	4.1.49	J. W. B. Robertson, R.D., R.N.R.	J. Brand, D. S. Carter, —. Briscoe, —. Floyd	T. Williams	T. & J. Brocklebank, Ltd.
Mahia	GNZV	21.11.50	—. Hayward	R. F. Hamilton, A. R. Stephenson, R. Munro, J. Magill	R. Haskayne	Shaw, Savill & Albion Co., Ltd.
Mahout	GDZN	22.5.50	J. Richardson	D. L. Campbell, E. G. Anderson, H. L. Burn	C. W. Jacobs	T. & J. Brocklebank, Ltd.
Mahseer	GZSV	5.6.50	L. T. Owen, O.B.E.	D. Carter, F. D. Mitchell, A. Halcrow	R. Burton	T. & J. Brocklebank, Ltd.
Mahsud	GSCP	6.9.49	L. E. Jeans	D. L. des Landes	B. Pinn	T. & J. Brocklebank, Ltd.
Maihar	GSCL	13.4.50	W. Gibson	O. Pritchard, F. Mitchell, P. A. Gunson	F. C. Bailey	T. & J. Brocklebank, Ltd.
Makalla	GOFN	14.6.50	T. C. Eddy	D. H. Morris, J. H. Bennett, T. Hamilton	G. Caddy	T. & J. Brocklebank, Ltd.
Malancha	GZRD	9.9.49	S. Broughton	J. Clarke, J. R. Kemp, D. J. Evans	B. J. Smith, M.B.E.	T. & J. Brocklebank, Ltd.
Malmesbury	MAQE	30.3.51	R. Ross	W. P. Russell, J. Hands, F. Ferguson	J. Atkinson	Houlder Bros. & Co., Ltd.
Maloja	GFBD	8.9.50	E. J. Parry	R. M. Sinclair, —. Eagle, W. C. Rimmer	W. Dawson	P. & O. Steam Navigation Co.
Manchester City	GBBP	6.4.50	H. Hancock	D. S. Millard, P. Fielding, R. O. White	A. S. J. Broadbent	Manchester Liners, Ltd.
Manchester Commerce	GKMY	29.8.50	M. E. Bewley	D. C. Woodall, J. E. Askew, F. Jones	F. M. Berry	Manchester Liners, Ltd.
Manchester Division	GBYR	2.6.50	W. Hine, R.D., Cdr., R.N.R.	G. S. Bacon, D. S. Millard, T. Hancock	R. S. Pogson	Manchester Liners, Ltd.
Manchester Merchant	MGZQ		F. D. Struss, O.B.E., D.S.C.	J. L. McLaren, R. Wadsworth, J. M. Rushworth		Manchester Liners, Ltd.
Manchester Port	GYNF	10.1.50	F. Downing	J. E. Jones, J. S. Dalgarno, T. W. Field, A. H. Swan	P. B. McNab	Manchester Liners, Ltd.
Manchester Progress	GPGD	12.10.50	E. W. Espley	G. R. Thompson, L. C. Taylor, N. W. Cockshoot	W. H. Critchley	Manchester Liners, Ltd.
Manchester Regiment	GBRD	19.10.49	E. W. Raper	W. Oliver, G. S. Bacon, A. Swan	A. Reid	Manchester Liners, Ltd.
Manchester Shipper	MAPC	14.1.47	F. L. Osborne	J. Lewis, J. Illingworth, T. H. Lynn	E. Ambler	Manchester Liners, Ltd.
Manchester Trader	GMWG	8.2.51	W. H. Downing	P. D. Cullen, D. G. Thomas, J. Sullivan	F. J. Fitzgerald	Manchester Liners, Ltd.
Mandasor	GBNY	8.11.49	R. Humble	C. Grey, G. W. Sinclair, P. Manson	G. W. Hazel	T. & J. Brocklebank, Ltd.
Mantola	GDMY		Rodney Stone			British India Steam Nav. Co., Ltd.
Marengo	GLFW	13.4.51	F. Ellison	H. Edwards, H. Riley, B. Tong	G. Camm	Ellerman's Wilson Line, Ltd.
Margay	GFYQ	22.5.50	E. A. Prentice	A. J. Thompson, B. S. Kenn, J. Jones	L. L. Lithgow	Kaye, Son & Co., Ltd.
Markhor	GTFZ	8.12.50	J. B. Newman	I. A. Maclaren, M. H. Taylor, P. L. Woodward, D. A. M. O'Byrne	G. Stone	T. & J. Brocklebank, Ltd.
Marna	MLPK	14.6.50	L. Robertson	I. C. Macdonald, A. Petrie	R. J. Sinclair	Chr. Salvesen & Co.
Marsdale	GBKB	18.10.50	M. Ferguson	C. Webster, J. Bennett, D. Hamilton	D. Chuster	Kaye, Son & Co., Ltd.
Martand	GTGG	18.10.50	T. Fox-Lloyd	F. Watkins, J. Robertson	D. H. Butterworth	T. & J. Brocklebank, Ltd.
Martita	GNQT	21.2.51	H. Bunn	M. G. Stevens, T. Macdonald, —. Lock	R. J. Holmes	Kaye, Son & Co., Ltd.
Mataroa	GCSV	19.3.51	R. G. James, R.D., Capt. R.N.R.	J. A. Williams, P. H. Carden, T. J. Whiston	L. Boyce	Shaw, Savill & Albion Co., Ltd.
Matheran	GOFQ	8.3.51	H. E. McGregor	H. Simpson, C. P. Margeson, R. F. Holland	G. W. Hazel	T. & J. Brocklebank, Ltd.
Matina	GSZX	21.12.50	H. Roberts, O.B.E.	W. F. Young, E. Whitehouse, —. Greenhalgh	D. Knight	Elders & Fyffes, Ltd.
Mauretania	GTTM	9.1.51	C. Ivan Thompson	M. B. Cox, O. F. Elsom, J. P. Ward, G. R. Carter	F. Clarke	Cunard Steamship Co., Ltd.
Media	GSWR	17.4.51	D. M. MacLean, D.S.C., R.D., R.N.R.	R. G. Hunt, G. W. Edwards, J. G. Parry	E. P. Bishop	Cunard Steamship Co., Ltd.
Melbourne Star	GDFZ	6.2.51	F. N. Riley, D.S.O.	H. Tompsett, G. Seager, S. Buchanan, W. Boome	J. Clarke	Blue Star Line, Ltd.
Millais	MAPH	13.4.51	A. R. Bibby, O.B.E.	B. Salisbury, J. L. Roberts, D. S. Sapp	V. Slevin	Lamport & Holt Line, Ltd.
Monarch	GBDF	5.4.51	J. P. F. Betson	—. Bates, J. Ruddock, A. Gillesbie, R. A. Evans, —. Chisholm	D. Rendell	H.M. Postmaster General
Mooltan	GFBC	2.6.50	C. E. Pollit	J. W. Owen, L. H. Kellett, E. M. Phelps	J. Ormiston	P. & O. Steam Navigation Co.
Mulbera	GFTM	12.1.51	A. M. Edmondson	P. Middleton	—. Phillips	British India Steam Nav. Co., Ltd.
Myrtlebank	GLQB	27.2.51	R. J. Owen	C. T. Lewis, A. Tavendale, A. Szimczack	F. McGuiness	Andrew Weir & Co., Ltd.

Name of Vessel	Call Sign	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owners/Managers
Napier Star	MAPN	30.3.51	M. B. M. Tallack, O.B.E.	J. Davies, J. G. Reeve, K. A. Stiasny	C. Wyllie	Blue Star Line, Ltd.
Naticina	GIGH	29.11.50	F. Mansfield	J. D. Dyson, A. Douglass, B. Bagler, J. Thompson, A. Batey	J. W. Starrs	Anglo-Saxon Petroleum Co., Ltd.
Neaera	MQTG		R. G. Green	V. Graham		Anglo-Saxon Petroleum Co., Ltd.
New Australia	GZKD	24.1.51	D. Aitchison	W. Newport, C. Tucker, —. Hayward, —. Bird, P. K. Murchison	—. Chick	Shaw, Savill & Albion Co., Ltd.
New Zealand Star	GYCR	17.4.51	E. N. Rhodes	W. Pitcher, A. R. Robinson, M. M. Jolly	A. B. Ewart	Blue Star Line, Ltd.
Newfoundland	GNMC	17.1.51	C. H. Kenyon	J. B. Stewart, J. T. Sheffield, E. W. Foxworthy	T. Cahill	Furness, Withy & Co., Ltd.
Nordic	GDJC	9.1.51	E. G. Jones	P. R. Edwards, K. L. Rowe, R. N. P. Johnston	T. D. Bailey	Prince Line, Ltd.
Norfolk	GJLV	14.11.50	B. Evans	—. Heron, A. P. Harrington, J. R. Witchell	F. Wilman	Federal Steam Navigation Co., Ltd.
Norwegian	GDMC	16.3.51	A. L. Hunter	W. Stockley, I. Hunter, G. M. Clarke	H. T. Hamer	Donaldson Bros. & Black, Ltd.
Nottingham	GCNC	28.11.50	H. D. Horwood, R.D., Cdr., R.N.R.	E. T. Worster, B. Linklater, I. Cubitt	J. Heath	Federal Steam Navigation Co., Ltd.
Nova Scotia	GNNK	14.3.51	J. L. Anson, O.B.E.	J. D. P. Williamson, R. Heys, R. Martin	W. C. Brock	Furness, Withy & Co., Ltd.
Novelist	GMLG	3.3.51	T. E. Steel	L. J. Sharman, G. B. Roberts, J. W. Embleton	J. J. Sheehy	T. & J. Harrison
Orari	GJKX	21.11.50	F. Lougheed	J. Crewdson, A. A. Faulkner, W. Dawes	C. Robinson	New Zealand Shipping Co., Ltd.
Orcades	MABA	22.9.50	I. E. G. Goldsworthy, R.D., R.N.R.	J. D. Birch, D.S.C., R.D., R.N.R., E. V. Harris, R.D., Lt. Cdr., R.N.R., R. F. Underwood, R. Fletcher, F. B. Woolley, F. H. Kidd, P. Watts	N. A. Boon	Orient Steam Nav. Co., Ltd.
Orion	GYKL	15.5.50	N. A. Whinfield	M. R. Wilmshurst, P. Leighton, D. P. Blois	T. H. Shannon	Orient Steam Navigation Co., Ltd.
Ormonde	GLYC	19.6.50	A. E. Coles, R.D., Cdr., R.N.R.	—. Edgecombe, J. K. Thornton, R. J. Brittain, J. S. Gregson, D. Ward, A. J. Field	R. Oakley	Orient Steam Navigation Co., Ltd.
Orontes	GBXM	3.8.50	S. S. Bernand, O.B.E.	G. Grandage, D.S.C., R.D., Cdr., R.N.R., W. B. Thomson, D. E. Hayes, L. Kingswood, Lt., R.N.R., J. Hughes, A. Harris	F. Murphy	Orient Steam Navigation Co., Ltd.
Otranto	GFKV	16.1.50	R. J. Galpin, R.D., Cdr. R.N.R.	E. Riddlesdell, R.D., Lt. Cdr., R.N.R., C. S. Thomas, J. W. Terry, G. McGowan, J. A. Benseley	C. J. Seaton	Orient Steam Navigation Co., Ltd.
Pacific Exporter	GBJC	19.3.51	G. Brown	J. Coyle, A. H. Linden, C. A. Hollingshead, —. Dawson	H. A. Clark	Furness, Withy & Co., Ltd.
Pacific Fortune	GBFM	22.2.51	E. O. Evans	P. J. Williamson, G. W. Whitby, W. G. Sturt, G. M. Willoughby	I. R. M. Thomas	Furness, Withy & Co., Ltd.
Pacific Importer	GDKV	18.8.50	B. M. Collard	G. Cook, A. H. Linden, E. H. Gregson		Furness, Withy & Co., Ltd.
Pacific Liberty	GDFQ	7.2.51	W. F. Swann	R. Coyle, N. R. Land, C. G. Stiff	W. Britton	Furness, Withy & Co., Ltd.
Pacific Nomad	GCRZ	1.8.50	W. Hutchinson	J. Tye, J. T. Cameron, P. Cable	A. Adamson	Furness, Withy & Co., Ltd.
Pacific Stronghold	GNSQ	8.7.50	F. H. Perry	I. H. Clarke, D. R. Gibson, R. W. Keene, R. Hughes	S. A. Vincent	Furness, Withy & Co., Ltd.
Pacific Unity	GUAN	14.11.50	E. A. Kemp	B. Estill, A. A. Drake, W. E. Thomas	A. E. Trim	Furness, Withy & Co., Ltd.

Palacio	GNJW	22.3.50	J. P. Harris	L. P. Sheppard, D. Fraser, R. M. Dunn	T. A. Robinson	MacAndrews & Co., Ltd.
Palana	MMBF	6.3.50	F. R. Spurr	—. Savage, —. Trower, G. E. Harris	H. Olding	P. & O. Steam Navigation Co.
Palomares	GJGN	15.11.50	D. J. Thomas, M.B.E.	D. A. Dickenson, W. H. Munday, A. Mannings	M. F. Conroy	MacAndrews & Co., Ltd.
Pampas	GCDL	22.3.50	R. C. S. Woolley, R.D., R.N.R.	H. Riley, J. A. Martin, B. Sugden	J. Tuck	Royal Mail Lines, Ltd.
Papanui	GDJW	1.3.51	D. Chadwick	B. E. Crust, M. R. Forcer, H. Sladen, J. Chin	P. Roberts	New Zealand Shipping Co., Ltd.
Paparoa	GBCZ	14.3.51	N. A. Thomas	J. D. Cubitt, F. I. Christall, M. J. Blake, R. G. Hollindale	A. B. Mowat	New Zealand Shipping Co., Ltd.
Paraguay	MAQS	31.1.50	H. V. Todd, R.D., Cdr., R.N.R.	A. R. Evans, R. H. Greenall, V. A. Sutton	P. Goulden	Royal Mail Lines, Ltd.
Pardo	GMNZ	1.9.50	T. Stephens	M. B. Wingate, G. Dudley, J. G. Lenfesty	P. Wadhams	Royal Mail Lines, Ltd.
Parima	GCLQ	21.3.49	H. E. Sang	G. A. Gibbons, J. C. Derby, A. H. Whittle	N. H. Crocker	Royal Mail Lines, Ltd.
Paringa	MMBD	12.8.50	H. P. Mallet	M. Waghorn, A. R. Howard, —. Shipp	B. S. Magennis	P. & O. Steam Navigation Co.
Parthia	GSWQ	4.8.50	J. W. Caunce, R.D., R.N.R.	A. P. Graham, T. Jones, T. H. Davies, G. H. Griffiths	A. O'Sullivan	Cunard Steamship Co., Ltd.
Perim	GCGB	21.12.50	W. Paice	F. F. Irons, N. G. Jenner, C. W. Lyon, P. W. Bull	F. Groves	P. & O. Steam Navigation Co.
Perthshire	GYWK	28.11.50	A. J. Hogg	A. H. Black, M. P. R. Turner, G. W. Sharp	F. Raynor	Turnbull, Martin & Co., Ltd.
Philomel	GYPV	18.10.50	H. M. Selmer	A. H. Tobin, H. T. Lentin, J. Chapman	T. Milnes	General Steam Navigation Co., Ltd.
Philosopher	MAQV	13.10.50	T. Winstanley	J. W. Kent, M. Watson, R. A. Patmore	W. C. Doyle	T. & J. Harrison
Pilcomayo	GBZX	15.5.50	F. A. C. Thacker	W. Kennedy, E. J. O'Keeffe	E. Jones	Royal Mail Lines, Ltd.
Pipiriki	GDRQ	21.12.50	H. R. M. Smith	I. C. Davidson, G. W. Wotton, J. Marshall	L. Carter	New Zealand Shipping Co., Ltd.
Polar Maid	MAQX	14.6.50	J. T. Leask	E. D. Smith, T. Gilmour, R. Marshall	W. Tulloch	Chr. Salvesen & Co.
Port Auckland	GWRB	31.10.50	J. G. Lewis, O.B.E.	F. R. Gorman, R. A. Holmes, V. A. Hunt, K. Jayne	J. S. Skinner	Port Line, Ltd.
Port Brisbane	GWRC	8.8.50	H. Steele, O.B.E.	F. Gorman, P. Smith	J. Griffiths	Port Line, Ltd.
Port Chalmers	GWQR	14.6.50	P. H. Pedrick	R. C. Webb, G. G. Gilling, E. R. Jenkins, C. Milne	E. G. Gunner	Port Line, Ltd.
Port Hobart	GKGC	9.5.50	L. Copeland	J. Porter, —. Dalton, A. Wardell	—. Brook	Port Line, Ltd.
Port Jackson	GZKR	1.1.51	P. S. Ball	H. Robson, D. J. Batterbee	R. C. Crompton	Port Line, Ltd.
Port Lincoln	GFZK	10.1.51	G. G. Langford	H. J. Thompson, V. G. K. Webster, R. Shircore	P. J. McKeon	Port Line, Ltd.
Port Macquarie	MAQY	4.4.51	L. J. Skailes	B. St. J. Smith, W. V. Lusted, J. Sharp	R. Robertson	Port Line, Ltd.
Port Napier	GPKD		G. W. Hazlewood	S. D. A. Pritchard		Port Line, Ltd.
Port Philip	MAQZ	12.1.51	J. G. Lewis, O.B.E.	T. G. Ward, —. Kensett, T. A. Fairbairn	B. McGovern	Port Line, Ltd.
Port Pirie	GLVQ	12.10.50	F. W. Bailey, M.B.E.	J. T. Owen, P. G. Henneker, W. A. Wakefield	W. Miller	Port Line, Ltd.
Port Vindex	MAUW		H. H. Smith, O.B.E.	D. N. Robinson, G. Ballinger, J. R. King		Port Line, Ltd.
Port Wellington	GDNJ	31.10.50	E. J. Syvret	C. A. Rhodes, I. H. Stewart, G. G. Mooney	J. B. French	Port Line, Ltd.
Port Wyndham	GYCW	14.11.50	E. E. Roswell	E. R. Cliffe, M. E. Field, W. M. G. Lloyd	J. N. Coutts	Port Line, Ltd.
Potaro	GNLJ	16.11.49	E. N. Giller	E. W. Williams, J. F. Scates, E. D. Long	E. O'Callaghan	Royal Mail Lines, Ltd.
Powell	GKJL		D. Cornwell			United Whalers, Ltd.
Pretoria Castle	GOAE	14.11.50	R. Wren, D.S.O.	M. B. Watts, K. J. Trayner, A. F. George	H. Oliver, M.B.E.	Union Castle Mail S.S. Co., Ltd.
Radley	GZZG	2.5.50	C. J. Forster	H. G. Strickland, D. A. Barfoot, J. D. Todd	P. Probert	Stephens, Sutton, Ltd.
Rakaia	GFGW	28.11.50	A. I. Robertson, A.D.C., R.D., R.N.R.	D. E. Moran, T. S. Wadie, M. D. Ward	R. Wilson	New Zealand Shipping Co., Ltd.
Ramore Head	MAXX	18.8.50	E. W. Black	N. C. Stark, R. Crawford, C. E. Pringle	B. P. Wilson	G. Heyn & Sons, Ltd.
Ranchi	GLKW	24.1.51	A. G. Jenkins	—. Woodroe, R. Lowther, P. Saunders, E. C. Jones, D. J. Masson	R. V. Gregory	P. & O. Steam Navigation Co.

Name of Vessel	Call Sign	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owners/Managers
Rangitane	GDBV	2.3.51	T. L. Maltby	F. S. Angus, P. Busby, T. Hughes, D. Gaskell	C. Lambe	New Zealand Shipping Co., Ltd.
Rangitata	GSZN	30.3.51	G. Kinnell, O.B.E.	D. Brittain, A. Elliott, G. Pool, J. M. Mead, T. Wadie	J. Grant	New Zealand Shipping Co., Ltd.
Rangitiki	GSXW	11.9.50	A. E. Lettington, O.B.E., D.F.C.	J. Guyler, A. Battley, G. W. Dunsford, P. Moolton, D. Sywel	J. Poyner	New Zealand Shipping Co., Ltd.
Rangitoto	GLMV	27.1.51	C. R. Pilcher	G. Bevis, J. Holley, A. Jenkins, D. Hellings, P. Mather	E. R. Saunders	New Zealand Shipping Co., Ltd.
Regent Hawk	GMND	7.3.51	G. H. Hobson	R. Armstrong, Z. Wojewodzki, L. S. Ziembicki	R. W. Jones	Regent Petroleum Tankship Co., Ltd.
Reina Del Pacifico	GMPS	29.6.50	J. Whitehouse	A. Lang, J. Peters, L. Whitaker	J. Butler	Pacific Steam Navigation Co.
Repton	GPFL	27.3.50	D. Cownie	D. M. Muir, W. Jones, O. N. Selwood	A. Lloyd	Galbraith, Pembroke & Co., Ltd.
Rhodesia Star	GUAX	21.11.50	G. L. Evans, O.B.E.	E. W. Jenkins, R. Bayley, R. B. Escreet	C. I. Roe	Blue Star Line, Ltd.
Rialto	GBLV	14.3.51	E. Tyler	N. Cook, T. Fugill, G. T. Lawson, H. K. Thompson	G. Shilson	Ellerman's Wilson Line, Ltd.
Richmond Castle	GCSP	8.7.50	A. G. Bidwell	J. M. Cairns, B. G. Evans, G. D. Attwood	W. A. Plater	Union-Castle Mail S.S. Co., Ltd.
Rippingham Grange	GIGP	1.7.50	R. Owen, O.B.E.	H. Butler, A. J. Bulley, J. Taylor, A. H. Fawcett	R. G. J. Alton	Houlder Bros. & Co., Ltd.
Rochester Castle	GZQF	25.4.49	T. H. Whatley	J. Taylor, R. G. Patterson, C. Campbell	P. Master	Union Castle Mail S.S. Co., Ltd.
Roslin Castle	GYJZ	25.7.50	F. R. Pope	R. J. Miller, D. Lawton	J. Tuck	Union Castle Mail S.S. Co., Ltd.
Rowallan Castle	GDFT	12.9.50	A. E. F. Payne	T. Allan, R. H. Hudson, E. J. C. Bennett	R. Emmett	Union Castle Mail S.S. Co., Ltd.
Roxburgh Castle	GBGS	8.3.51	J. D. B. Fisher	J. Kerr, F. J. Pye, M.B.E., S. K. Smith	P. W. Moor	Union Castle Mail S.S. Co., Ltd.
Royal Star	MARJ	18.7.50	G. Aldridge	W. Borthwick, B. Edgington, S. Buchanan	R. Read	Blue Star Line, Ltd.
Ruysdael	MAQP	31.10.50	J. Burns	R. J. Scott, G. Leith	R. J. C. Holmes	Bolton S.S. Co., Ltd.
Sacramento	GKCN	14.3.51	J. E. Robinson, M.B.E.	F. Johnson, W. White, M. F. H. Taylor	J. P. Carter	Ellerman's Wilson Line, Ltd.
St. Zeno	MQMJ		L. Abbey			
Salacia	GZRN	14.11.50	T. S. Graham	J. L. Downie, D. Nicholson, E. H. Knox	W. Docherty	Donaldson Bros. & Black, Ltd.
Salamanca	GLSG	7.12.50	A. Lyall	R. B. Bryant, J. Bruce, F. Hyland	A. Hill	Pacific Steam Navigation Co.
Salaverry	GBLQ	11.1.50	G. B. Wardale	P. D. O'Driscoll, P. B. Webster, J. J. Butterworth	J. Slater	Pacific Steam Navigation Co.
Salinas	GLLK	22.5.50	T. J. Naylor	K. Thomas, W. Washington, W. R. Holmes	J. Cummins	Pacific Steam Navigation Co.
Salween	GFFN	23.4.51	S. S. Duncan	C. R. Roy, T. A. Hood, J. Coogans, K. Campbell	—. Brown	P. Henderson & Co.
Samanco	MARQ	20.4.49	A. Lyall	D. I. Jones, W. B. Holmes, D. J. Houghton	A. Hatfield	Pacific Steam Navigation Co.
San Adolfo	GYKK	21.11.50	—. McLeod	A. Walker, D. P. Carroll, D. Frazer	H. Hughes	Eagle Oil & Shipping Co., Ltd.
San Cirilo	GZMR	21.12.50	T. L. Pearson	E. N. Givens, B. J. Hamilton, D. N. Richards	W. W. Ellison	Eagle Oil & Shipping Co., Ltd.
San Felix	GFJZ	21.11.50	C. Summers	W. Gibb, R. Wilkinson, I. Boon	W. L. Radcliffe	Eagle Oil & Shipping Co., Ltd.
San Velino	GCNY	14.11.50	J. B. Macarthy	M. H. Jones, G. G. B. Putt, H. Bailey	J. P. Brosnan	Eagle Oil & Shipping Co., Ltd.
San Veronico	MASQ	6.3.51	G. R. Pearson	R. P. Errington, J. B. Hunter, L. F. Lawrence	H. G. Burton	Eagle Oil & Shipping Co., Ltd.
San Vulfrano	MASR	3.10.50	F. R. H. Atkinson	T. D. Wright, D. P. Carroll, R. K. Wighley	E. Ingham	Eagle Oil & Shipping Co., Ltd.
Sansu	GQQN		O. Owens, O.B.E.			Elder Dempster Lines, Ltd.
Santander	GBNR	19.3.51	E. C. Hicks	G. Patterson, D. A. Baker, T. Nick	I. Humphreys	Pacific Steam Navigation Co.
Sarmiento	MARW	17.1.51	G. H. Rice	F. Nuttall, A. M. Jestico, W. A. E. Johnston	N. Roberts	Pacific Steam Navigation Co.

Saxon Star	MARX	22.3.51	R. Macdonald	C. Holleyoak, R. Middleton, W. Davidson	R. Deakin	Blue Star Line, Ltd.
Scholar	GDCC	7.3.51	D. Wolstenholme	D. F. A. Bloom, R. E. Harvey, T. M. Hemingway	R. Anderson	T. & J. Harrison
Scottish Prince	GDSK	3.10.50	—. Wiles	R. W. G. Brown, N. Gale, G. Ballard	P. M. Evans	Furness, Withy & Co., Ltd.
Scythia	GDYP	14.3.51	J. V. Locke	W. L. McDougall, T. Grindrod, D. A Davies	L. Varmin	Cunard Steamship Co., Ltd.
Selector	MARZ	3.3.49	W. H. Salughter	W. McInnes, W. Owens, O. T. Jones, R. M. Harrison	J. Clerk	T. & J. Harrison
Shielbank	GDPZ	17.4.51	C. S. Holbrook	N. Haliday, C. H. Drummond, B. E. Watson	W. C. Arscott	Andrew Weir & Co., Ltd.
Silverbriar	GDWM	15.5.50	W. N. Tulloch	J. H. Tomlinson, D. Lamont, A. N. Cockcroft	J. A. Wickens	Silver Line, Ltd.
Silverguava	GMVK	12.10.50	J. Duncan, O.B.E.	F. Hewitt, J. S. Bowman, G. A. Hubbard	J. P. Deagan	Silver Line, Ltd.
Silveroak	GCQR	20.4.51	T. S. Morgan, O.B.E.	J. McK. Batchen, T. Martyn, I. F. Robertson, E. A. Hansen	D. Redwood	Silver Line, Ltd.
Silverplane	MABL	31.10.50	E. Stark	H. R. H. Rose, G. K. Harrison, C. C. Walker	A. Arthurs	Silver Line, Ltd.
Silversandal	GSFQ	12.1.51	G. F. Chivers	G. F. Lightfoot, A. M. Kirkby, D. Goddard	P. Killeen	Silver Line, Ltd.
Silverteak	GSFR	22.3.51	E. L. Tilmouth	L. W. Rothwell, C. H. Goddard, D. M. Bailey	S. D. Cox	Silver Line, Ltd.
Silverwalnut	GSFT	12.1.51		J. M. Evans, J. B. de Wet, O. R. Purvis	J. Hands	Silver Line, Ltd.
Sneaton	GDBS	28.11.50	W. Armstrong	E. Wilson, J. Marshall, F. T. Lamb	T. Goodrum	Headlam & Son
Socotra	MASC	14.6.50	J. C. W. Last, O.B.E., Cdr., R.N.R.	J. L. Dunkley, G. P. Blyth, T. M. Lincoln, P. B. Jackson	H. F. Kemp	P. & O. Steam Navigation Co.
Somerset	GJMN	12.1.51	P. S. Calcutt	C. S. Masson, R. E. Baker, C. A. Miller, C. S. Keay	P. Broome	Federal Steam Navigation Co., Ltd.
South Africa Star	GUAU	21.12.50	R. M. T. Jones	J. G. King, W. V. L. Burne, M. C. H. Hills	M. H. Aldersley	Blue Star Line, Ltd.
Southern Atlantic	GBLY	30.8.50	M. G. Oliver	L. M. Smith, A. Anderson, D. Lawson	P. Curzon	Chr. Salvesen & Co.
Southern Collins	MASE	20.4.50	L. Robertson	I. Sinclair, D. Moar, G. Reid	J. MacKinnon	Chr. Salvesen & Co.
Southern Garden	MASF	23.4.51	W. J. Swanson	T. Johnson, J. Flucker, K. T. Austin	G. R. Campbell	Chr. Salvesen & Co.
Southern Opal	MASG	22.8.50	A. F. Baikie	W. Spence, J. L. Logie, R. Kinder	C. Houston	Chr. Salvesen & Co.
Sovac	GDDV	30.1.51	A. McCausland	W. Lyall, H. G. Moon, D. Gleadow	K. C. Morris	Vacuum Oil Co., Ltd.
Speaker	GCGT	13.1.51	E. V. Dunn	W. E. Kind, J. M. Doran, T. Pennant	J. Clarke	T. & J. Harrison
Specialist	GCYF	10.11.48	L. F. Harriman	L. Coggins	J. Glover	T. & J. Harrison
Springfjord	GQKQ	18.1.49	T. R. Mackle	J. Reid	A. Guy	Springwell Shipping Co., Ltd.
Stancourt	GKCP	21.12.50	—. MacAlpine	R. Smith, A. Bilsen	M. K. Kavanagh	J. A. Billmeir & Co., Ltd.
Stanhall	GCQZ	14.11.50	L. M. Davies	M. O'Neil, T. Mitchell, J. Caldwell	L. Boughton	J. A. Billmeir & Co., Ltd.
Stirling Castle	GYPX	5.9.50	W. A. Pace, O.B.E.	J. Dammarell, J. Parker, E. Pickles	P. P. Williams	Union-Castle Mail S.S Co., Ltd.
Stirlingshire	GCQD	20.4.51	E. W. Jenkins	T. R. Halliday, J. Caley, G. M. Silvers	N. J. Braddon	Turnbull, Martin & Co., Ltd.
Strathaird	GRSX	13.4.51	H. S. Allan, R.D., Cmde., R.N.R.	—. West, —. Knowles, K. Walker, G. Makin, D. J. Knight, A. W. Pickering	J. F. Clark	P. & O. Steam Navigation Co.
Stratheden	GDGT	8.9.50	S. W. S. Dickson	—. Mayne, —. Vickers, A. T. Savage, B. B. Jones, G. V. Holmes, —. Williams	H. S. Horn	P. & O. Steam Navigation Co.
Strathmore	GYMS	1.3.51	C. S. Parker	J. B. Wilson, T. V. Morehead, C. I. H. Greaves	J. P. Carey	P. & O. Steam Navigation Co.
Strathnaver	GRPZ	25.4.51	J. C. Mellonie	D. T. Bolas, E. Aikman, D. Fanthorpe	A. Miller	P. & O. Steam Navigation Co.
Struan	MASJ	2.6.50	M. Polson	S. Sutherland, —. Ross, G. MacDonald	W. Hayes	Chr. Salvesen & Co.
Suffolk	GQQS	3.10.50	F. Pover	B. E. Applegate, P. J. Field, M. J. Byrd	H. Hare	Federal Steam Navigation Co., Ltd.
Suncrest	GNWW	13.10.50	A. Miller	N. Munce, P. A. Kelly, J. B. Dale	G. Dennison	Crest Shipping Co., Ltd.
Sussex	MAEF		F. Lougheed			Federal Steam Navigation Co., Ltd.
Sutherland	GBYG	14.11.50	R. W. Nicolson	E. F. Smith, G. Galloway, R. B. Campbell	I. R. Lloyd	B. J. Sutherland & Co., Ltd.
Swainby	GPFS	25.4.51	R. D. Sparling	P. Henderson, T. Hastings, P. Dyer	S. R. Johns	Sir R. Ropner & Co., Ltd.

Name of Vessel	Call Sign	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owners/Managers
Sydney Star ..	MKSM	8.7.50	T. F. McDonald, O.B.E. ..	R. H. R. Jones, F. A. Ball, I. C.Mackintosh	J. McConnell ..	Blue Star Line, Ltd.
Talca	GCDT	22.5.50	T. G. McGill	R. Riley, A. Gibson, M. Backhouse ..	S. Johns	Pacific Steam Navigation Co.
Tamaroa	GFWX	17.1.51	G. P. McCraith	J. G. Beck, D. G. Ede, H. F. Singleton	D. MacRae	Shaw, Savill & Albion Co., Ltd.
Tamele	GCBF	18.10.50	W. Munt	H. Butler, C. B. Powell, —. Boyle, —. Tunnicliffe	F. Broomfield ..	Elder Dempster Lines, Ltd.
Tarkwa	MASU	4.10.50	G. D. Simpson	W. Lowthian, G. Cooke, R. Martin ..	G. I. Gilling.. ..	Elder Dempster Lines, Ltd.
Tasso	GLMR	14.11.50	F. Mason	A. T. Jardine, J. E. Wray, G. Mitchell ..	D. Withers	Ellerman's Wilson Line, Ltd.
Tectus	GBMJ	23.2.51	K. J. Morris	C. L. Fiddler, A. C. Watson, T. H. Potts	J. M. Murphy ..	Anglo-Saxon Petroleum Co., Ltd.
Tekoa	GJFQ	7.12.50	J. D. Bennett	A. S. Collins, E. J. Newing, P. B. Eccles ..	T. Herbert ..	New Zealand Shipping Co., Ltd.
Telemachus	GBLB	31.3.51	J. F. Webster	J. Dunlop, R. Brett, A. M. Blackburn ..	A. Davis	A. Holt & Co.
Teviot	MASX	29.6.50	L. T. Peterson	H. W. Riley, J. M. Barber, R. G. Stapleton	F. Fawcett	Royal Mail Lines, Ltd.
Thamesfield	GDGK	27.1.51	M. H. Hooker	J. Blakie, I. A. M. Haddow, J. Horsbough	S. O'Driscoll ..	Hunting & Son, Ltd.
Theliconus	GBMT	24.1.51	T. W. A. Webster ..	R. A. Moorhouse, P. S. L. Nobes, P. J. E. Marshall	P. J. Cottrill ..	Anglo-Saxon Petroleum Co., Ltd.
Timaru Star ..	GKKM		C. Watson	H. R. Tompsett		Blue Star Line, Ltd.
Tinto	GBYT	13.4.51	S. H. Bennett, M.B.E. ..	C. Everingham, D. M. Smee	A. A. Harrison ..	Ellerman's Wilson Line, Ltd.
Tongariro	GLFZ	14.6.50	C. P. Robinson	M. M. Shaw, R. Loveridge, J. B. Camping	J. A. Hasson.. ..	New Zealand Shipping Co., Ltd.
Torr Head	GZPW	13.10.50	M. Kennedy	E. G. Davy, J. McCormick, E. McCudden	G. Penketh	G. Heyn & Sons, Ltd.
Tregenna	GBPM		C. Lloyd Collings, O.B.E...			Hain S.S. Co., Ltd.
Trelevan	GBPQ	30.3.51	S. K. Hawken	P. E. Maiden, R. T. Lewis, B. R. Welbury	I. W. Hart	Hain S.S. Co., Ltd.
Trelyon	GBPP	20.2.51	F. J. Cornish, M.B.E. ..	H. Gravell, P. Haggarty, J. M. Downard	T. H. Murrin ..	Hain S.S. Co., Ltd.
Tresillian	GCKP	28.12.50	J. C. Bate, O.B.E. ..	J. Williams, B. Martin, V. Wise	J. Jenkinson	P. & O. Steam Navigation Co.
Trevaylor	GCKG	22.8.50	A. G. Williams, O.B.E. ..	T. J. Smith, D. Fife, T. Youdan ..	—. Tyrer	Hain S.S. Co., Ltd.
Tribesman	GBNZ	28.12.50	J. W. F. Wallis	D. V. Jones, J. Cubbin, H. Bennet ..	S. Pepper	T. & J. Harrison
Tribulus	GFJS	21.3.51	H. Sangster	P. Marking	J. Colley	Anglo-Saxon Petroleum Co., Ltd.
Tronda	MMLX	24.4.50	A. Goodlad..	R. Tomkins		Chr. Salvesen & Co.
Tweed	GBRP	14.11.50	G. S. Grant, R.D., Cdr., R.N.R.	R. M. Tysoe, W. B. Baxter, J. P. L. Thornhill	M. Healy	Royal Mail Lines, Ltd.
Twickenham	GNDC	22.11.49	J. A. Tully	H. Black, J. Porteous, J. C. Taylor ..	J. T. Berrie ..	Watts, Watts & Co., Ltd.
Umtali	GYWB	12.1.51	F. E. J. O'Hea	D. L'Estrange, J. Lang, J. H. Butcher, F. Bush	S. Hewitt	Bullard, King & Co., Ltd.
Umtata	GDQF	13.9.50	F. Harris	J. Thorn, E. Le Vine, R. Paterson, G. T. Gibson	A. H. Coxhead ..	Bullard, King & Co., Ltd.
Umzinto	GIFQ	3.10.50	R. Harber	E. Bicknell, J. H. Beavan, D. Banks ..	J. S. Sprunt	Bullard, King & Co., Ltd.
Vancouver City ..	GIGT	1.1.51	M. D. Louttit, O.B.E. ..	A. B. Parkhouse, J. B. Cuckow, E. J. Thompson	R. Butcher	Sir Wm. Reardon Smith & Sons, Ltd.
Vandalia	GCRQ		G. S. Evans			Cunard S.S. Co., Ltd.
Vardulia	GCFW	4.4.51	A. N. Sargent, O.B.E., R.D., R.N.R.	J. C. Nicholson, A. W. Hoyle, P. Walton, —. Blackman, P. King	S. Fitzpatrick ..	Cunard S.S. Co., Ltd.
Volo	GPCJ	31.10.50	G. Mussared	J. Weatherston, S. Wilkinson, —. Gooderham	G. Williams	Ellerman's Wilson Line, Ltd.
Waimana	MATW	18.8.50	C. L. Carroll, D.S.C., R.D., R.N.R.	A. C. D. Masters, J. Scott, D. E. Aberdeen	A. Morris	Shaw, Savill & Albion Co., Ltd.
Waipawa	GWXQ	14.11.50	G. Campbell	J. Carroll, A. Stephenson, H. M. Hignett, A. Cripps	J. Murphy	Shaw, Savill & Albion Co., Ltd.
Wairangi	MATX	4.4.51	H. C. Smith	C. W. Sendall, C. Laddington	W. Freeman ..	Shaw, Savill & Albion Co., Ltd.

Waiwera	GBJB	6.2.51	L. J. Hopkins	P. M. Williams, D. H. Clarke, C. Tucker	J. Downie	Shaw, Savill & Albion Co., Ltd.
Walvis Bay	GKBZ		H. Gentles	J. Marshall		Sir R. Ropner & Co., Ltd.
Wanstead	GFLS	8.12.50	D. G. Martin	I. Jackson, R. G. Charlton, N. Atkinson, D. Stokoe	R. Stewart	Watts, Watts & Co., Ltd.
Warwick Castle	GRRJ	3.10.50	J. Trayner	R. Taylor, P. E. Eckford, N. E. Upham	E. Shaw	Union-Castle Mail S.S. Co., Ltd.
Wendover	GFML	2.3.51	F. W. Grist	P. Rawlinson, E. Peirce, D. Griffin	P. E. Thomas	Watts, Watts & Co., Ltd.
Winchester Castle	GTPZ	26.8.50	H. A. Deller	C. E. Walker, R. Lofts, B. Braithewaite	R. Brew	Union-Castle Mail S.S. Co., Ltd.
Woodford	GFMM		W. Shields, O.B.E.	J. Swann, J. Kirby, —. Partridge	W. McKenize	Watts, Watts & Co., Ltd.
Worcestershire	GFZM	16.2.51	F. C. Brooks	R. L. Hagley, A. M. McLean, R. G. Lovegrove, R. Phillips	W. Fletcher	Bibby Bros. & Co.
Yoma	GLPN	14.11.49	S. Thompson	J. Thomson, W. E. Harris, T. F. Fields	W. Allen	P. Henderson & Co.
Zealandic	MAGJ	29.6.50	P. F. Owens	P. H. Jowett, I. Sladen, P. G. Jenkins, D. Anderton	A. McLennan	Rio Cape Line, Ltd.

Supplementary Ships

Name of Vessel	Call Sign	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owners/Managers
Bellerby	MQJF		F. Tate			Ropner Shipping Co., Ltd.
British Duke	GVSW		H. J. McMichael	W. McMorland, J. A. Duck, D. E. Buckley	F. D. Musson	British Tanker Co., Ltd.
Cedarpool	MAHG		J. E. Roddam		N. O'Loughlin	Sir R. Ropner & Co., Ltd.
City of Khios	GKYB		A. S. Horan	S. Hider, M. Arnold, J. Branscombe		Ellerman Lines, Ltd.
Clan Alpine	GIFF		G. Vernon-Greene			Cayzer, Irvine & Co., Ltd.
Coptic	GSND		E. Sainsbury			Shaw, Savill & Albion Co., Ltd.,
Eastbank	GFKR		R. Smith	C. G. Watterson, P. Hewitt	W. D. Atkinson	Andrew Weir & Co., Ltd.
Empire Dove	GCMZ		W. G. Marks	K. Davis, I. Evans, —. Ardus		MacAndrews & Co., Ltd.
Empire Medway	GSXV		H. A. Shaw			Prince Line, Ltd.
Empire Trooper	GLXJ		R. H. A. Bond, O.B.E.	P. A. Chubb, T. Kutek, P. Trace	J. Readon	British India Steam Nav. Co., Ltd.
Folda	MLFR		E. Tulloch			Chr. Salvesen & Co.
Frobisher	GTRN		V. A. Buschini	J. A. Wright		R. S. Hewett
Greenland	GCLJ	28.11.50	C. F. McDonald	A. Millar, J. Thompson, J. Borthwick	D. W. Crearie	Currie Line, Ltd.
Harmattan	GNYD		A. F. Lidguard			J. & C. Harrison, Ltd.
Hollybank	MANY		A. J. Whiston			Andrew Weir & Co., Ltd.
Leicestershire	GDBL		R. Cuming, D.S.C.			British India Steam Nav. Co., Ltd.
Llangibby Castle	GPLV	30.3.51	D. D. Mackenzie	—. Underdown, J. Howson, St. Q. Beadon, D. J. Jones, R. Olden	J. Eager	Union-Castle Mail S.S. Co., Ltd.
Maple Hill	MANE					Counties Ship Management Co., Ltd
Markab	GCVT	20.5.49	R. Chapman	A. Stuart, W. Russell	W. Brown	Phocean Ship Agency, Ltd.
Modasa	GFDZ		R. Brignall	W. Brown		British India Steam Nav. Co., Ltd.
Mulberry Hill	MAKQ		J. Campbell			Counties Ship Management Co., Ltd.
New Prince	GBRN		N. Jinks			R. S. Hewett
Port Alma	GSTN		D. F. Morgan	R. A. Wight, E. Newstead, W. M. G. Lloyd		Port Line, Ltd.
Port Fairy	GSTP		J. A. Fairbairn	M. L. Mitchell		Port Line, Ltd.
Red Crusader	GTBP		R. Nash			E. D. W. Lawford
Red Knight	MBQT		J. Tomlinson	F. O'Brian	R. Green	E. D. W. Lawford
Red Lancer	MKTP		E. Littler			E. D. W. Lawford
Red Rose	MFMX		J. McKernan			E. D. W. Lawford
Scotia	GPYM		E. A. Bruce	J. Craig		Scottish Home Department
Stankeld	GZQQ		J. McAlpine	H. Decalour, B. Willis, T. Cummings	S. Kirkwood	J. A. Billmeir & Co., Ltd.
Tarantia	GIGS		A. J. F. Colquhoun	J. C. Ross, H. A. Cameron		Anchor Line, Ltd.

Name of Vessel	Call Sign	Last Return Received	Captain	Observing Officers	Senior Radio Officer	Owners/Managers
**Queen of Bermuda* ..	GZKF		L. F. Banyard, O.B.E. ..	N. E. James	H. Stennett	Furness, Withy & Co., Ltd.
Conway, H.M.S. ..	—	13.4.51	E. Hewitt, R.D., Capt. R.N.R.	The Senior Cadets	—	—
Pangbourne Nautical College	—	14.11.50	H. C. Skinner, O.B.E., Cdr. R.N.	The Senior Cadets	—	—
Worcester, H.M.S. ..	—	31.3.51	G. C. Steele, V.C., Cdr. R.N. (Retd.)	The Senior Cadets	—	—

* This ship has been recruited by the Bermuda Meteorological Service.

FLEET LIST (South Africa)

The following is a list of observing ships voluntarily co-operating with the Meteorological Service of South Africa.

Name of Ship	Captain	Observing Officer	Senior Radio Officer	Shipping Company or Operator
Africana II	R. L. V. Shannon, O.B.E.	A. Thomas, D.S.C.		Department of Fisheries, Cape Town
Agulhas	T. Y. Thompson ..	A. Harvey	E. Grover	South African Railways Ships, Cape Town
Aloe	R. Lewis	K. M. Botha	R. Parker	South African Railways Ships, Cape Town
Baltic Coast	H. H. Coor	L. W. Coltham	R. E. Star	Thesen's Steamship Co., Cape Town
Bokkeveld	A. W. Jewiss	I. A. Clark	F. P. Garnett ..	Arden Hall Steamship Co., Pretoria
Constantia	A. M. Barlow	P. A. T. Gordon	I. D. Flood	South African Marine Corporation, Cape Town
Damaraland	N. Waiter	M. A. Hoffman	J. Stamp	South African Lines, Ltd., Cape Town
Empire Victory				Union Whaling Co., Ltd.
Gilia	J. Lundberg			Irvin & Johnston, Ltd., Cape Town
Kaapland	C. B. Adkins	P. D. Aldworth	M. Hutchons	South African Lines, Cape Town
Morgenster	F. D. Wilkinson ..	H. M. Stephens	G. Adey	South African Marine Corporation, Cape Town
Namaqualand	B. Parnaby	C. B. O'Connor	P. Goggin	South African Lines, Cape Town
Pequenea		M. T. Scott		Tristan Exploration Co., Cape Town
Vergelegen	D. W. Thorpe	N. T. Casley	P. Boyd	South African Marine Corporation, Cape Town
South African Nautical College				
General Botha	G. V. Legassick, D.S.C., R.D.. Cdr., R.N.R. ..	The Senior Cadets		

FLEET LIST (Hong Kong)

VOLUNTARY OBSERVING SHIPS

The following is a list of observing ships voluntarily co-operating with the Royal Observatory, Hong Kong

Name of Ship	Captain	Observing Officers	Senior Radio Officer	Shipping Company or Operators
Anking	E. H. Histead	W. Davidson, J. D. de C. Veale, G. Baxter	G. W. Moore	China Navigation Co., Ltd.
Anshun	J. McKinlay	R. E. S. Jones, J. R. Brett, D. S. Southey	P. L. Littin	China Navigation Co., Ltd.
Bencleuch				Ben Line, Ltd.
Caroline Moller	W. J. Lang	R. H. W. Jackson, N. F. Andrade, Yuan King Lau	P. N. Bhatt	Mollers (Hong Kong), Ltd.
Chang Sha	C. P. Miller	V. R. Woolfe, S. Fergusson, R. Tasker, P. Baxter	R. Gooseman	China Navigation Co., Ltd.
Choy Sang	W. E. Reeve	F. H. Main, E. Jones, A. A. Watson	R. M. Legg	Indo-China Steam Navigation Co., Ltd.
Chun Sang	D. R. G. Kinnear	E. M. Norman, P. D. Coles, T. Y. Yuan	P. J. Beham	Indo-China Steam Navigation Co., Ltd.
Eastern Glory	L. McRae	T. J. Ashcroft, W. E. S. Cream, R. W. E. Little, D. H. Mason	C. D. Evans	Indo-China Steam Navigation Co., Ltd.
Eastern Saga	S. Schofield	C. Thomson, M. J. K. Crighton, J. D. Markland, R. Latchum	R. Stewart	Indo-China Steam Navigation Co., Ltd.
Eastern Queen	D. G. Burleigh	M. I. Groundwater, D. R. McFadzien, I. McInnes, R. J. Cooper	B. Johnson	Indo-China Steam Navigation Co., Ltd.
Eastern Trader	J. L. Baines	A. C. Tai, C. H. Fong, S. H. Ng	F. de Lage	Great Southern Steamship Co., Ltd.
E Sang	G. Owens	J. H. Thomas, C. Przybylinski, G. E. Tinlay	T. R. Crockett	Indo-China Steam Navigation Co., Ltd.
Fengtien	F. Gibbs	J. Hunter, J. F. O'Connor, T. R. Young	U. In San	China Navigation Co., Ltd.
Foochow	F. Kelly	A. V. Harrison, R. A. Button, A. P. Sokoloff	P. S. Beryar	China Navigation Co., Ltd.
Fort Charlotte	D. B. C. Relph, O.B.E., D.S.C.	S. S. F. Dalgleish, J. Owen, P. P. Gardett	H. C. W. Rankin	Royal Fleet Auxiliary
Frosty Moller				Mollers' (Hong Kong), Ltd.
Fukien	I. Newton	J. R. Keddie, R. Perry, C. F. Chan	T. S. Leung	China Navigation Co., Ltd.
Green Ranger	E. Payne	A. M. Telser, A. D. Walters, W. Carr	A. M. A. Chandney	Royal Fleet Auxiliary
Greystoke Castle	L. Rowe	F. Kelly, J. E. Crowden, K. Rowe	D. G. Sirno	Mollers' (Hong Kong), Ltd.
Hai Lee	J. Hansen	—. Torkildsen, E. Tufte, H. Anderson	K. T. Ip	China Siam Line
Hai Meng	T. Stange-Olsen	O. Schibsted, E. Tohrmervik, A. Skjorwestad	K. T. Chan	China Siam Line
Hang Sang	L. W. Harrison	J. E. Williams, R. Grieve, A. Nelson	Lok Yung	Indo-China Steam Navigation Co., Ltd.
Hanyang	M. Defty	L. Walker, A. C. Ingles, P. Y. Lam	Lo Kin Chek	China Navigation Co., Ltd.
Heinrich Jessen	R. D. Nielsen	S. Chr. Jensen, O. K. Nielsen, K. P. Yip	E. Berlard	Jebsen & Co., Ltd.
Hermelin	S. Eliassen	T. Pedersen, A. Andersen, H. Berge		China Siam Line
Hermod	A. Apold	J. Eide, A. Holdoy, R. Gronvold	Y. H. So	China Siam Line
Hew Sang	E. J. Thomson	J. McFarlane, J. G. Perrin, H. Wood	H. K. Ho	Indo-China Steam Navigation Co., Ltd.
Hin Sang	G. W. F. Edwards	E. P. Ladbrooke, C. M. Wilson, J. M. Taylor	P. L. Ma	Indo-China Steam Navigation Co., Ltd.
Hiram	G. Hamre	G. Sundholm, J. Jacobsen, H. Fredenborg	C. H. Lai	China Siam Line
Hoi Houw	A. Fjeleheim	K. Munkejord, O. Ostedal, K. Kristoffersen	A. J. Takvam	Jebshun Shipping Co., Ltd.
Hoi Wong	M. Bjerjenes	M. Maland, O. Lindanger, M. Madsen	O. Torresdal	Jebshun Shipping Co., Ltd.

FAX

Name of Ship	Captain	Observing Officers	Senior Radio Officer	Shipping Company or Operators
Hunan	A. H. Finnie	V. Walker, P. C. J. Cockburn, C. C. Sieh	P. C. Choy	China Navigation Co., Ltd.
Hupeh	J. W. E. Warrior	J. C. Christal, C. Stark, C. F. Chan	Tsang Kau	China Navigation Co., Ltd.
Kut Sang	L. C. Cox	I. Rowland-Jones, E. Chase, M. T. G. Fish	J. L. Robertson	Indo-China Steam Navigation Co., Ltd.
Kweiyang	W. B. B. Paul	W. Pollock, S. W. Owen, J. H. Twibill	Lin Yuk Kong	China Navigation Co., Ltd.
Lok Sang	R. I. Groundwater	F. W. Cross, J. K. King, K. C. Yeung	J. E. Chew	Indo-China Steam Navigation Co., Ltd.
Mui Ann			A. Ovland	Chin Seng Hong Shipping Co., Ltd.
Mui Heng	Karl M. Svendsen	—. Martin, S. Severinsen, Egil Linge	Chang Shan Wai	Chin Seng Hong Shipping Co., Ltd.
Muncaster Castle	G. Anderson	W. A. Finlay, L. L. Watson, P. Potts, A. Layfield	V. B. Ritson	Mollers' (Hong Kong), Ltd.
Pakhoi	G. P. Cope	P. Flory, A. Harper, P. Bulatoff	Seung Kan	China Navigation Co., Ltd.
Poyang	D. C. Sim	W. E. Hargrave, A. Bartley, C. M. Li	Li San Kan	China Navigation Co., Ltd.
Produce	A. S. Bugge	T. Kobiesen, H. Sivertsen	T. Solheim	Karsten Larssen & Co. (Hong Kong), Ltd.
Sangola	J. B. Cooke	L. O. Harborow, J. M. Woolcock, J. R. D. McLeod	R. O. Smith	British India Steam Navigation Co.
Shansi	E. G. Thomas	W. J. Coburn, G. Young, W. C. Hsu	D. Fong Yan	China Navigation Co., Ltd.
Shengking	J. G. Smart	C. A. N. Baker, D. I. Robertson, S. K. Chen	R. M. Inwood	China Navigation Co., Ltd.
Shillong	H. J. M. Perry	J. P. McArthur, E. Snowden, C. B. Thompson	J. Mathews	P. & O. Steam Navigation Co.
Sinkiang	A. Taylor	P. H. Ward, F. W. Ridley, S. T. Sung	F. O. Chin	China Navigation Co., Ltd.
Sirdhana	W. Brown, M.B.E.	D. C. Murison, T. Woodward, D. T. Brown	J. E. Ward	British India Steam Navigation Co.
Soochow	A. Naismith	B. McLennan, A. C. Atkinson, S. N. Lai	R. R. Stevenson	China Navigation Co., Ltd.
Szechuen	L. V. Rowe	S. Davidson, W. T. Masters, V. A. Boutskai	P. L. Tsang	China Navigation Co., Ltd.
Tai Chung Shan	A. H. Bathurst	Lee Kong Yen, S. C. Chan	Chan So	Shun Cheong Steam Navigation Co., Ltd.
Taiyuan	Y. N. Campbell	A. Watson, H. A. Ledeboer, D.S.C., F. T. Quinn, R. J. Porter	D. F. Macdonald	China Navigation Co., Ltd.
Tak Sang	W. T. Rochester	W. J. Bartlett, J. M. Marshall, K. Y. Feng	E. A. West	Indo-China Steam Navigation Co., Ltd.
Tsinan		G. D. O. Rennie	Wai Pun Un	China Navigation Co., Ltd.
Wing Sang	H. G. Goddard	H. A. Greenwood, J. R. G. Findlay, W. E. McLackland	A. G. Lum	Indo-China Steam Navigation Co., Ltd.
Wo Sang	N. H. King	R. C. Traill, R. P. Farquhar, D. D. Battell	T. Ovens	Indo-China Steam Navigation Co., Ltd.
Yochow	F. Hindle	E. W. Woodcock, I. Robinson, K. W. Wu	S. C. Cheung	China Navigation Co., Ltd.
Yunnan	E. Bruce	G. A. Abbs, J. R. Suffren, D. J. Coombes	C. C. Tye	China Navigation Co., Ltd.

FLEET LIST (New Zealand)
VOLUNTARY OBSERVING SHIPS

The following is a list of observing ships, voluntarily co-operating with the Meteorological Service of New Zealand.

Name of Vessel	Captain	Observing Officer	Radio Officer	Owners
Selected Ships :				
Kaitoke	A. F. Inman	G. R. Inkster	L. M. Harvey	Union S.S. Co., Ltd.
Karitane	C. W. Dovey	W. Weatherup	A. E. Whalley	Union S.S. Co., Ltd.
Kauri	J. Billingham	R. E. P. Williams	G. B. Blake	Union S.S. Co., Ltd.
Komata	W. J. Hill	P. Nash	R. H. Willis	Union S.S. Co., Ltd.
Kopua	F. T. Chapman	I. G. Sykes	W. L. Lambie	Union S.S. Co., Ltd.
Korowai	R. Blampied, M.B.E.	L. J. Lynch	T. Roberts	Union S.S. Co., Ltd.
Koromiko	H. S. Collier	H. G. Harwood	W. Hawkins	Union S.S. Co., Ltd.
Kurow	F. W. Gibson	A. W. Hannam	B. G. Hart	Union S.S. Co., Ltd.
Matua	A. R. Russell	R. D. Bennett	H. A. Shields	Union S.S. Co., Ltd.
Maui Pomare	L. C. Boulton	J. Hare	W. A. Taylor	Government of New Zealand
Monowai	G. B. Morgan, D.S.O.	K. D. Mitchell	J. G. Rea	Union S.S. Co., Ltd.
Piri	M. W. Monaghan	J. Drummond		I.C.I., Ltd.
Port Waikato	C. Keith	J. Flette		Holm & Co.
Waipori	S. C. Angus	R. K. Brown	J. Anderson	Union S.S. Co., Ltd.
Wairata	W. E. Jones	P. W. Callender	A. A. Lindsay	Union S.S. Co., Ltd.
Wairimu	C. Burgess	J. G. Waites	C. Ward	Union S.S. Co., Ltd.
Waitaki	E. F. Rainbow	R. G. Anderson	B. Sword	Union S.S. Co., Ltd.
Waitemata	D. M. Keith	J. A. Barbour		Union S.S. Co., Ltd.
Supplementary Ships :				
James Cook	A. Deed	E. G. Rapley	A. J. Jeans	H. C. S. Coasters
Kaimiro	D. C. Champion	H. A. Hodkinson		Union S.S. Co., Ltd.
Kakapo	R. Ainsworth	E. G. Trousdale	E. A. Miller	Union S.S. Co., Ltd.
Kamo	A. W. Pert	S. Peterson		Union S.S. Co., Ltd.
Karepo	W. Kehoe	E. M. Bieneman		Union S.S. Co., Ltd.
Kartigi				Union S.S. Co., Ltd.
Kiwitea	G. M. Schofield	A. B. MacDonald	R. N. Dennis	Union S.S. Co., Ltd.
Manuka	E. J. Johnston			Chatham Fishing Co.
Omana	H. L. P. Brown	H. J. Southworth	H. T. Fernandes	Union S.S. Co., Ltd.
Viti	F. A. Barrett	L. Lindsay		Tasman S.S. Co., Ltd.

FLEET LIST (Australia)

VOLUNTARY OBSERVING SHIPS

The following is a list of observing ships voluntarily co-operating with the Meteorological Service of Australia

Name of Vessel	Captain	Observing Officers	Senior Radio Officer	Owners/Agents
Selected Ships:				
Canara	W. Bird, O.B.E.	T. Woodward, J. D. Campbell, C. C. Springall	P. A. Stuart	British India Steam Nav. Co.
Chupra	J. D. Woods	C. Allerton, H. S. Strawbridge, W. L. Hillcoat	R. C. Whiting	British India Steam Nav. Co.
Idomeneus	J. L. Johnston	W. A. Clark, G. D. F. Cruickshank, P. S. Lombard, G. Moncks	A. N. Williams	A. Holt & Co.
Koolinda	J. S. Airey	J. Paulsen, J. Palfreyman, R. Seaward	H. White	Western Australian State Steamships
Koomilya	F. W. Roberts	C. Stewart, R. Sicklin, G. Steinbeck	F. Mackie	McIlwraith, McEacharn, Ltd.
Kooringa	F. McLean	A. D. Hanson, V. Bovell, J. A. Grey		McIlwraith, McEacharn, Ltd.
Lowana	L. Fry	C. A. Blow, T. H. Millidge, J. K. Saint	R. M. Rees	Melbourne Steamship Co., Ltd.
Nellore	T. Mills	A. Johnston, G. Champion, G. Cleveland, K. Skinner	J. Bell	Eastern & Australian S.S. Co., Ltd.
Orestes	F. J. Cockburn	A. Surtees, G. Kitching, R. Denning, P. Beckett	J. Dennison	A. Holt & Co.
River Burnett	L. G. Ramsay	R. Campbell, H. W. Robinson, T. Beckinsale	F. E. Audsley	Australian Shipping Board
River Clarence	W. W. Fish	A. T. Lake, I. K. S. Adam, S. F. Dockwell	G. Harper	Australian Shipping Board
River Mitta	A. Knight	G. Davies, K. Clarence, W. Wiggins	M. Pearson	Australian Shipping Board
Triadic	A. Rhoades	J. P. Milton, W. L. Harboard, W. B. Jeavons	M. Hayter	British Phosphate Commission
Trienza	P. Richardson	D. Neilson, D. Robb, K. Oliver	J. Ward	British Phosphate Commission
Triona	C. L. Evans	P. W. Thompson, S. E. B. Harris, B. J. Robertson	R. G. Neale	British Phosphate Commission
Wanganella	—	—	—	Huddart, Parker, Ltd.
Supplementary Ships:				
Diomed	A. M. Caird	H. A. Jeffrey, K. W. Dunlop, E. Webb	C. Palmer	A. Holt & Co.
Derrigo				Australian Shipping Board
Kybra				Western Australian State Steamship

FLEET LIST (India)

The following is a list of observing ships, voluntarily co-operating with the India Meteorological Department.

Name of Vessel	Owners
Selected Ships:	
Alavi	Mogul Line, Ltd.
Bahadur	Asiatic Steam Navigation Co., Ltd.
Chanda	British India Steam Navigation Co., Ltd.
Dara	British India Steam Navigation Co., Ltd.
Daressa	British India Steam Navigation Co., Ltd.
Dumra	British India Steam Navigation Co., Ltd.
Dwarka	British India Steam Navigation Co., Ltd.
Englestan	Scindia Steam Navigation Co., Ltd.
Havildar	Asiatic Steam Navigation Co., Ltd.
Islami	Mogul Line, Ltd.
Jalazad	Scindia Steam Navigation Co., Ltd.
Jaladuta	Scindia Steam Navigation Co., Ltd.
Jalaganga	Scindia Steam Navigation Co., Ltd.
Jalamani	Scindia Steam Navigation Co., Ltd.
Jalamanjari	Scindia Steam Navigation Co., Ltd.
Jalaprakash	Scindia Steam Navigation Co., Ltd.
Jalarashmi	Scindia Steam Navigation Co., Ltd.
Jalaveera	Scindia Steam Navigation Co., Ltd.
Jalavihar	Scindia Steam Navigation Co., Ltd.
Jalayamuna	Scindia Steam Navigation Co., Ltd.
Jehangir	Mogul Line, Ltd.
Kampala	British India Steam Navigation Co., Ltd.
Karanja	British India Steam Navigation Co., Ltd.
Khosrou	Mogul Line, Ltd.
Maharaja	Asiatic Steam Navigation Co., Ltd.
Mahadevi	Asiatic Steam Navigation Co., Ltd.
Nadir	Asiatic Steam Navigation Co., Ltd.
Nurjehan	Asiatic Steam Navigation Co., Ltd.
Rajput	Asiatic Steam Navigation Co., Ltd.
Rajula	British India Steam Navigation Co., Ltd.
Shahjehan	Asiatic Steam Navigation Co., Ltd.
Singu	Burma Oil Co., Ltd.
Sirsa	British India Steam Navigation Co., Ltd.
Subadar	Asiatic Steam Navigation Co., Ltd.
Tairea	British India Steam Navigation Co., Ltd.
Warla	British India Steam Navigation Co., Ltd.
Yenangyaung	Burma Oil Co., Ltd.
Supplementary Ships:	
Akbar	Mogul Line, Ltd.
Badarpur	Burma Oil Co., Ltd.
Barala	British India Steam Navigation Co., Ltd.
Begum	Asiatic Steam Navigation Co., Ltd.
Bharatjal	Bharat Line, Ltd.
Bharat Rani	Bharat Line, Ltd.
Itaura	British India Steam Navigation Co., Ltd.
Jaladurga	Scindia Steam Navigation Co., Ltd.
Jalagopal	Scindia Steam Navigation Co., Ltd.
Jalajawahar	Scindia Steam Navigation Co., Ltd.
Jalaketu	Scindia Steam Navigation Co., Ltd.
Jalakrishna	Scindia Steam Navigation Co., Ltd.
Jalamayur	Scindia Steam Navigation Co., Ltd.
Jalaratna	Scindia Steam Navigation Co., Ltd.
Jalavijaya	Scindia Steam Navigation Co., Ltd.
Malika	Asiatic Steam Navigation Co., Ltd.
Masimpur	Burma Oil Co., Ltd.
Nurani	Asiatic Steam Navigation Co., Ltd.
Risaldar	Asiatic Steam Navigation Co., Ltd.
Rizwani	Mogul Line, Ltd.

FLEET LIST (Canada)
VOLUNTARY OBSERVING SHIPS

The following is a list of observing ships voluntarily co-operating with the Meteorological Service of Canada.

Name of Vessel	Owners
Selected Ships	
Aorangi	Canadian Australasian Line.
Canadian Challenger	" Canadian Challenger ", Ltd. (Canadian National Steamships).
Canadian Constructor	" Canadian Constructor ", Ltd. (Canadian National Steamships).
Canadian Cruiser	" Canadian Cruiser ", Ltd. (Canadian National Steamships).
Esso Knoxville	Imperial Oil, Ltd.
Fort Amherst	Furness, Withy & Co.
Fort Townshend	Furness, Withy & Co.
Imperial Alberta	Imperial Oil, Ltd.
Imperial Charlottetown	Imperial Oil, Ltd.
Imperial Fredericton	Imperial Oil, Ltd.
Imperial Quebec	Imperial Oil, Ltd.
Imperial Toronto	Imperial Oil, Ltd.
Imperial Winnipeg	Imperial Oil, Ltd.
John S. Pillsbury	Upper Lakes and St. Lawrence Transportation Co. Ltd
Lady Nelson	" Lady Nelson ", Ltd. (Canadian National Steamships).
Lady Rodney	" Lady Rodney ", Ltd. (Canadian National Steamships).
Lake Minnewanka	Western Canada Steamship Co., Ltd.
Lake Pennask	Western Canada Steamship Co., Ltd.
Lake Sicamous	Western Canada Steamship Co., Ltd.
Lake Winnipeg	Western Canada Steamship Co., Ltd.
Ottawa Valley	Montreal, Australia, New Zealand Line, Ltd.
Waihemo	Canadian Union Line, Ltd.
Waikawa	Canadian Union Line, Ltd.
Wairuna	Canadian Union Line, Ltd.
Waitomo	Canadian Union Line, Ltd.
Lightships :	
Lurcher Lightship	Minister of Transport.
Sambro Lightship	Minister of Transport.
Supplementary Ships:	
Lake Manitou	Western Canada Steamship Co., Ltd.
Pinnacles	Deep-Sea Tankers, Ltd.
Rupertsland	Hudson's Bay Co., Ltd.
Tantara	Johnson Walton Steamships, Ltd.

LIGHT VESSELS

The following Light Vessels voluntarily observe and report from coastal waters of Great Britain.

Name of Vessel	Masters
Dowsing	J. R. Audley, S. R. Smith
East Goodwin	A. Giblin, F. M. England
Galloper	S. J. Vincent
Humber	F. I. Butcher, L. A. Brett
Newarp	B. Hadden, R. J. Middleton
Royal Sovereign	W. J. Sheaf
Shipwash	G. W. Broom, C. G. Isaac
Smith's Knoll	W. J. Hall, J. W. R. Reeve

MARID SHIPS

The following is a list of ships voluntarily observing and reporting sea temperatures from coastal waters of Great Britain. Captains are requested to point out any errors or omissions in the list.

Name of Vessel	Call Sign	Captain	Owners/Managers
Actuality	GPPF	W. Conn	F. T. Everard & Sons, Ltd.
Allurity	MQFS	W. N. Fisher	F. T. Everard & Sons, Ltd.
Amsterdam	MFBP	C. R. Baxter, D.S.C.	British Railways (Eastern Region)
Angelo	GQFY	S. N. Stokes	Ellerman's Wilson Line, Ltd.
Ariosto	GKPW	A. Morrill	Ellerman's Wilson Line, Ltd.
Atlantic Coast	GWSY	P. A. Johnson	Coast Lines, Ltd.
Baltraffic	GTXN	F. S. J. Butcher	United Baltic Corporation, Ltd.
Belravock	MKGV	T. Wallace	London & Edinburgh Shipping Co., Ltd.
Belvina	MLZF	J. Philip	London & Edinburgh Shipping Co., Ltd.
Borthwick	MNWK	G. Simpson	Geo. Gibson & Co., Ltd.
British Scout	GJKD	R. G. Hughes	British Tanker Co., Ltd.
Cambria	GBKT	J. Hughes	British Railways (London Midland Region)
Clupea	GOAJ	J. Jappy	Scottish Home Department (Fishery Division).
Corfen	GDJX	E. R. W. Allen	Wm. Cory & Son, Ltd.
Corfleet	GWTD	A. G. Waller	Wm. Cory & Son, Ltd.
Corfoss	MAHX	F. E. W. Farrant	Wm. Cory & Son, Ltd.
Cormain	MAHT	R. B. Armstrong	Wm. Cory & Son, Ltd.
Cormead	GDBX	T. Slack	Wm. Cory & Son, Ltd.
Cormist	GDVT	R. J. Barrow	Wm. Cory & Son, Ltd.
Cormoat	GLKV	J. U. Hansen	Wm. Cory & Son, Ltd.
Cormull	MAHS	E. S. Keene	Wm. Cory & Son, Ltd.
Corncrake	MJKL	R. Warren	General Steam Nav. Co., Ltd.
Crane	MMCS	H. T. Griffiths	General Steam Nav. Co., Ltd.
Drake	MMYC	R. B. Langley	General Steam Nav. Co., Ltd.
Duke of Argyll	GNVX	F. Adern, D.S.C.	British Railways (London Midland Region)
Duke of Lancaster	GCPQ	E. B. Serjeant	British Railways (London Midland Region).
Duke of Rothesay	GNVL	H. Thompson	British Railways (London Midland Region).
Eildon	MLZL	J. Little	G. Gibson & Co., Ltd.
Empire Cedric	GRSC	W. N. Johnson	Frank Bustard & Sons, Ltd.
Empire Gaelic	MAVR	W. H. Laws, R.D., Cdr., R.N.R.	Frank Bustard & Sons, Ltd.
Explorer	MRCZ	G. B. McLaren	Scottish Home Department (Fishery Division).
Falcon	MNXL	K. Carmalt	General Steam Nav. Co., Ltd.
Golden Dawn	MLZV	Lieut. A. Adamson, M.B.E., R.N.R.	The Captain.
Grebe	MAEY	E. C. Painter, D.S.C.	General Steam Nav. Co., Ltd.
Guernsey Coast	MANS	H. Keilit	British Channel Islands Shipping Co., Ltd.
Harrogate	MNDB	D. Stokes	Associated Humber Lines.
Hibernia	MBMT	R. Woodhall	British Railways (London Midland Region).
Highwood	MLQQ	J. Coupland	E. R. Newbigin, Ltd.
Hindlea	GWDQ	P. Cullen	Hindlea Shipping Co., Ltd.
Horsa	MPFJ	D. Dickson	Currie Line, Ltd.
Isle of Guernsey	GQYJ	F. E. Trout	British Railways (Southern Region).
Isle of Jersey	GRBQ	A. Light	British Railways (Southern Region).
Isle of Sark	GTSR	C. E. Durley	British Railways (Southern Region).
London Merchant	MBRZ	C. A. Piper	London Scottish Lines, Ltd.
Malmo	GQCN	A. D. Seath	Ellerman's Wilson Line, Ltd.
Marine Craft Unit (R.A.F.) No. 1102	—	Flt. Lt. L. Ambler	Royal Air Force, Calshot.
Melrose	MCFD	G. Simpson	Geo. Gibson & Co., Ltd.
Melrose Abbey	GSYW	J. Laverack	Associated Humber Lines.
Minna	GKPS	T. Mather	Scottish Home Department (Fishery Division).
Moray Coast	MKDL	J. T. Williams	Coast Lines, Ltd.
Ocean Coast	GYMP	G. Mearns	Coast Lines, Ltd.
Petrel	MBGV	R. Beattie, M.B.E.	General Steam Nav. Co., Ltd.
Plover	MLLV	A. L. Ward	General Steam Nav. Co., Ltd.
St. Clair	MMFX	T. Gifford	North of Scotland & Orkney & Shetland Steam Nav. Co., Ltd.
St. Clement	GRGM	W. J. Ramsay	North of Scotland & Orkney & Shetland Steam Nav. Co., Ltd.
St. Helier	GLBT	R. Pitman, D.S.C.	British Railways (Western Region).
St. Julien	GLBV	L. J. Richardson	British Railways (Western Region).
St. Magnus	GFYK	W. G. Stout	North of Scotland & Orkney & Shetland Steam Nav. Co., Ltd.
St. Ninian	GJBB	A. M. Dundas	North of Scotland & Orkney & Shetland Steam Nav. Co., Ltd.
Salerno	GSPW	D. B. Ramsbottom, D.S.C.	Ellerman's Wilson Line, Ltd.
Selby	MLFT	A. W. Johnson	Associated Humber Lines.
Slieve Bawn	MQCC	W. N. Greenwood	British Railways (London Midland Region).
Slieve Bearnagh	MLNL	A. E. Willmott, D.S.C., R.D., Cdr. R.N.R.	British Railways (London Midland Region).
Slieve Bloom	MQDD	W. E. Meade	British Railways (London Midland Region).
Slieve Donard	MQCQ	C. A. Winckle	British Railways (London Midland Region).
Slieve League	MQCM	R. E. Sherwood, D.S.O., R.D., Cdr., R.N.R.	British Railways (London Midland Region).
Slieve More	MQBM	N. Lloyd Williams	British Railways (London Midland Region).
Southern Coast	MASD	G. Goldman	Coast Lines, Ltd.
Truro	GJTQ	J. B. Dunkley	Ellerman's Wilson Line, Ltd.
Vanellus	GDVW	J. E. Green	British & Continental S.S. Co., Ltd.
Vienna	GTBR	A. Pearson Sultan	British Railways (Eastern Region).

NOTICES TO MARINE OBSERVERS

Postal Arrangements

The quarterly numbers of *The Marine Observer* are published on the last Wednesdays of December, March, June and September.

The Marine Observer is addressed to the Captain, S.S./M.V....., c/o the owners, and captains are requested to make their own arrangements for forwarding.

Shipowners, Marine Superintendents, and all concerned in the despatch of mails to ships are asked to kindly facilitate the despatch and delivery of mail received at their offices from the Meteorological Office and " Air Publications and Forms Stores ", to their ships abroad.

Addressed to the captains of ships, this contains information required for the conduct of meteorological work at sea, and is most effective if received by the captains at the earliest possible date.

" The Marine Observer "

Captains of observing ships are requested to ensure that all officers, who participate in the voluntary meteorological work carried out by the ship, have access to *The Marine Observer*.

Ice Observation

Drifting ice, derelicts, and other floating dangers to navigation are reported by all means of communication at the disposal of the master.

See Chapter 12, pages 96–98 of the *Marine Observer's Handbook*, Seventh Edition.

It is also desirable that more detailed information than can be given in a TTT wireless message should be available to the Meteorological Office for the purpose of research, and for Admiralty Charts and Sailing Directions.

Marine observers will greatly assist by noting the conditions of ice, either drifting or fast, in the pages provided at the end of the logbook (Form 911), or on Form 912, which may be supplied to the captain of any British ship on application to a Port Meteorological Officer or Merchant Navy Agent.

Observing ships using the Trans-North Atlantic tracks are requested to record not only when ice is encountered, but also when they have passed through the ice region during the ice season without encountering ice. In this case a " nil " report should be returned, since it is desirable as far as possible to determine when tracks have been clear of ice.

RETURN OF LOGBOOKS

Owing to the need for strict economy in the use of paper, observing officers should endeavour to fill up their logbooks (Forms 911), before returning them to the appropriate Meteorological Service, except when insufficient space remains for the recording of observations during a further complete passage.

Indicator " OBS " in Radio Weather Messages

The attention of marine observers and particularly of radio officers in Observing Ships is drawn to the necessity of strict adherence to the use of the indicator—" OBS "—preceding the telegraphic address to which the radio weather message is transmitted. Failure to comply with this regulation leads to considerable delay in the clearance of the weather messages.

Address and Despatch of Radio Weather Messages

The Masters of Selected and Supplementary Ships are requested to draw the attention of their observing officers and radio officers to the necessity of ensuring that radio weather messages are:

(*a*) Addressed to the appropriate addresses in whatever area the ship happens to be.

(*b*) Transmitted through one of the radio stations specified in M.O.477 *The Marine Observer's Guide* or *Admiralty List of Radio Signals*, Vol. III, Part A, for the reception of such messages.

On occasions, when out of touch with any of the specified radio stations of a particular area, it does happen that a Selected Ship sends a radio weather message through some other radio station. The ship obviously does this with a desire to be as helpful as possible, and there is no doubt that such a report is frequently of great value. Nevertheless, such messages sent through radio stations other than those detailed to receive weather messages cause financial difficulties and rather a lot of international correspondence, as special arrangements have to be made for payment thereof.

It is for this reason that Masters of Observing Ships are asked to draw this matter to the attention of their officers.

If out of touch with any of the appropriate radio stations, it will probaby be helpful if radio weather messages are despatched CQ so that they can perhaps be intercepted by other ships and even by shore stations.

Atlantic Weather Bulletin for Shipping (Great Britain)

The following schedule (broadcast from Portishead Radio) replaces that printed on page xxv of the April, 1951, *The Marine Observer*. This revised schedule has been promulgated in Provisional Amendment 2/51 to *The Marine Observer's Guide*.

PARTS	G.M.T.	APRIL TO SEPTEMBER, 1951	
		Call Sign	Frequencies kc/s (Wavelengths)
I II III V VI	0930*	GKU 6 GKB 4 GKC 3 GKC 4 GKT 4	109 (2751) 12678 (23·66) 8210 (36·54) 12612 (23·79) 12622 (23·76)
	2130*	GKU 6 GKB 3 GKC 4 GKC 5 GKT 3	109 (2751) 8340 (35·97) 12612 (23·79) 16885 (17·77) 8220 (36·49)
IV	1130	GKU 6 GKB 5 GKC 4 GKC 5 GKT 4	109 (2751) 16440 (18·25) 12612 (23·79) 16885 (17·77) 12622 (23·76)

*Preceded by navigational warnings

The schedule for October, 1951, to March, 1952, has not yet been settled. Details will be given later.

NAUTICAL OFFICERS AND AGENTS OF THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE, GREAT BRITAIN

Captains and observing officers of the Voluntary Corps of Marine Observers will always be welcomed at headquarters, where the Marine Superintendent will be pleased to show them how their observations are utilised in meteorological research and weather forecasting.

Headquarters—Commander C. E. N. Frankcom, O.B.E., R.D., R.N.R., Marine Superintendent, Meteorological Office, Air Ministry, Headstone Drive, Harrow, Middlesex. (Telephone : Harrow 4331, Ext. 324.)

Commander J. Hennessy, R.D., R.N.R., Deputy Marine Superintendent. (Telephone : Harrow 4331, Ext. 323.)

Mersey.—Commander M. Cresswell, R.N.R., Port Meteorological Officer, Room 617, Royal Liver Building, Liverpool, 3. (Telephone : Central 6565.)

Thames.—Commander C. H. Williams, R.D., R.N.R., Port Meteorological Officer, Room 218, Ibex House, Minories, London, E.C.3. (Telephone : Royal 1721.)

Bristol Channel.—Mr. J. C. Matheson, Port Meteorological Officer, 2 Bute Crescent, Cardiff. (Telephone : Cardiff 4474.)

Southampton.—Captain J. R. Radley, Port Meteorological Officer, 19 Queen's Terrace, Southampton. (Telephone : Southampton 4295.)

Clyde.—Captain R. Reid, Port Meteorological Officer, 53 Bothwell Street, Glasgow. (Telephone : Glasgow Central 2558.)

AGENTS

Forth.—Captain G. More, " Craigneuk ", Dechmont, West Lothian. (Telephone : Dechmont 19.)

Humber.—Captain R. E. Dunn, c/o Principal Officer, Ministry of Transport, Trinity House Yard, Hull. (Telephone : Hull 38613.)

Tyne.—Captain F. B. West, Custom House Chambers, Quayside, Newcastle-on-Tyne. (Telephone : Newcastle 23203.)

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AUSTRALIA

Melbourne.—Lieut.-Commander S. W. S. Robertson, D.S.C., R.A.N., Port Meteorological Officer, Meteorological Branch, Department of Interior, P.O. Box 1289K, Melbourne, Victoria. (Telephone : F.J. 9171.)

BRITISH EAST AFRICA

Dar-es-Salaam.—Meteorologist-in-Charge, Meteorological Department, Post Office Box 597. (Telephone : 2297.)

BRITISH WEST AFRICA

Accra.—The Chief Meteorologist, Meteorological Office. (Telephone : Accra 672.)

Bathurst.—The Meteorologist, Meteorological Office, Yundum. (Telephone: Yundum Airport, Ext. 9 and 21.)

Freetown.—The Meteorologist, Meteorological Office, Lungi. (Telephone: Lungi, Ext. 8.)

Lagos.—The Chief Meteorologist, Meteorological Office, Ikeja. (Telephone: Lagos 1081, Ext. 1.)

CANADA

Headquarters.—Controller, Meteorological Division, Department of Transport, 315 Bloor Street W., Toronto, 5.

Halifax.—O.I.C. Dominion Public Weather Office, 728 Dominion Public Building, Halifax, N.S. (Telephone: 3–8314.)

Saint John—Officer-in-Charge, The Observatory, Saint John, N.B. (Telephone: 3–3500.)

Vancouver.—Mr. R. F. Kennett, Room 401, Winch Building, Vancouver, B.C. (Telephone: MArine 4321.)

FIJI

Suva—Observer-in-Charge, Meteorological Office, Lauthala Bay.

HONG KONG

W. B. Goodfellow, Marine Liaison Officer, Royal Observatory. (Telephone: 58038.)

INDIA

Bombay.—The Director, Regional Meteorological Centre, Colaba, Bombay, 5. (Telephone: 35378.)

Calcutta.—The Director, Regional Meteorological Centre, Alipore, Calcutta, 27. (Telephone: South 2782.)

Madras.—The Director, Regional Meteorological Centre, Nakshatra Bungla, College Road, Madras, 6. (Telephone: 8109.)

MALAYA

Singapore.—The Director, Málayan Meteorological Service, Sixth Floor, Fullerton Building. (Telephone: 7123.)

NEW ZEALAND

Headquarters.—The Director, Meteorological Office, Kelburn, Wellington, New Zealand. (Telephone: 44418.)

Wellington.—Marine Meteorological Officer, Post Office Box 72. (Telephone: 44–418, Ext. 930.)

Auckland.—Port Meteorological Officer, Meteorological Office, Mechanics Bay, Auckland. (Telephone: 49551.)

Lyttleton.—Officer-in-Charge, Meteorological Office, Wigram Aerodrome. (Telephone: 32–585.)

Dunedin.—Officer-in-Charge, Meteorological Office, Taieri Aerodrome, Dunedin. (Telephone: 21–666.)

PAKISTAN

Chittagong.—The Director, Regional Meteorological Centre, Diwan, Bazar. (Telephone: 202).

Karachi.—The Director, Regional Meteorological Centre, Meteorological Office, Karachi Airport, Karachi. 11. (Telephone: 9280, 9281, 2894, 2895, 2896, Ext. 225.)

SOUTH AFRICA

Cape Town.—A. B. Crawford, Meteorological Office, Post Office, Maitland, Cape Town.

Some Atlases prepared in the Marine Branch of the Meteorological Office and published by His Majesty's Stationery Office

Atlantic Ocean

Monthly Meteorological Charts of the Atlantic Ocean (M.O. 483, 1948). 19¾ in. × 24 in. £2 15s. (1s.).

Monthly Sea Surface Temperatures of the North Atlantic Ocean (M.O. 527, 1949). 19¾ in. × 12½ in. 10s. (3d.).

Quarterly Surface Current Charts of the Atlantic Ocean (M.O. 466, 1945). 22½ in. × 17⅜ in. 12s. (6d.).

Monthly Ice Charts of Western North Atlantic (M.O. 478, 1944). 12 in. × 7½ in. 4s. (3d.).

Indian Ocean

Monthly Meteorological Charts of the Indian Ocean (M.O. 519, 1949). 15½ in. × 22 in. £3 3s. (11d.).

Indian Ocean Currents (M.O. 392, Second Edition 1939, reprinted 1950). 30 in. × 20 in. 10s. (3d.).

Pacific Ocean

Monthly Meteorological Charts of the Eastern Pacific (M.O. 518, 1950). 17 in. × 23½ in. £4 4s. (1s. 4d.).

Monthly Meteorological Charts of the Western Pacific (M.O. 484, 1947). 16¾ in. × 24 in. £2 2s. (1s.).

Monthly Sea Surface Temperatures of Australian and New Zealand Waters (M.O. 516, 1949). 19¾ in. × 12½ in. 10s. (3d.).

Quarterly Surface Current Charts of the Western North Pacific Ocean, Westward of Long. 160°W., with Monthly Chartlets of the China Seas (M.O. 485, 1949). 21 in. × 16 in. £1 5s. (5d.).

South Pacific Ocean Currents (M.O. 435, 1938, reprinted 1944). 34½ in. × 24 in. 7s. 6d. (6d.).

Arctic Ocean

Monthly Ice Charts of the Arctic Seas (M.O.M 390a, revised 1944). 12 in. × 7 in. 3s. 6d. (3d.).

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Cloud Forms. Definitions and descriptions, with photographs of clouds. M.O. 233, 6th Edition, 1949, reprinted 1950. 1*s.* 3*d.* (1*s.* 4*d.*)

Weather Map. An introduction to modern meteorology. M.O. 225 i, 3rd edition, 1939; reprinted 1950 (see also Meteorological Glossary, in continuation of the "Weather Map"). 3*s.* 6*d.* (3*s.* 8*d.*)

Meteorological Glossary (continuation of the "Weather Map", *q.v.*). M.O. 225 ii, 3rd edition, 1939, reprinted 1950. 8*s.* 6*d.* (8*s.* 11*d.*)

Handbook of Weather Messages, Codes and Specifications. M.O. 510.

Part I. Transmission schedules and station index numbers. 1949. 2*s.* 6*d.* (2*s.* 8*d.*)

Part II. Codes and specifications. 1948, reprinted 1950. 2*s.* 6*d.* (2*s.* 8*d.*)

Part III. Coding, decoding and plotting. 1948, reprinted 1950. 2*s.* (2*s.* 2*d.*)

(*Amendments issued as necessary and priced separately.*)

Instructions for the preparation of weather maps with tables of the specifications and symbols. M.O. 515. 1949, reprinted 1950. 9*d.* (10*d.*)

International Meteorological Code adopted by the International Meteorological Organisation, Washington, 1947. **Decode for the use of shipping,** incorporating the code for weather reports from and to ships and the analysis code for the use of shipping. M.O. 509, 2nd edition, 1950. 1*s.* (1*s.* 1*d.*)

Meteorological Handbook for Pilots and Navigators. M.O. 448, 2nd edition, 1942, reprinted 1950. 2*s.* 6*d.* (2*s.* 9*d.*)

A Short Course in Elementary Meteorology. By W. H. Pick, B.Sc., F.C.P., F.Inst.P. M.O. 247, 5th edition, 1938, reprinted 1950. 2*s.* 6*d.* (2*s.* 9*d.*)

Meteorology of Airfields. By C. S. Durst, B.A. M.O. 507, 1949, reprinted 1950. 2*s.* (2*s.* 2*d.*)

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